

2013-2014
PROFESSIONAL
IRRIGATION
PRODUCTS





Only one major irrigation brand is totally dedicated to the professional. That brand is Irritrol. Everything we design and manufacture goes to you. The pros. The ones who make their living installing and selling what we make. Which means we don't sell to big box stores or hardware centers. Since 1967, we've dedicated everything we do to just the pros. You're the ones who built our company. You're the ones who'll keep building our company. And in our book, loyalty is a very big thing.



TABLE OF CONTENTS

CONTROLLERS	ROTORS	
Controllers "At-A-Glance"2	Rotors "At-A-Glance"	68
KwikDial® Series4	430R Series ½" Rotor	70
Rain Dial® Series6	TITAN™ ½"& ¾" Rotor	71
JR MAX™ Series8	550R Series ¾" Rotor	
Junior DC™ Series10	Platinum Sport Series 1" Rotor	74
Total Control® Series	SPRAY HEADS & NOZZI	EC
PCW Control		
MC-E "Blue" Series	Spray Heads "At-A-Glance"	
IBOC® Plus Series	I-PRO™ Series	
Sentar II™	I-PRO™ MPR/Specialty Nozzles Series	80
Rain Master® Eagle™	Pro-VAN Nozzles Series	82
Rain Master® TWICE™ 2-Wire26	533 Bubbler	
SENSORS & REMOTES	Accessories	85
	Super Blue Flex™/Flex Assemblies	86
Sensors & Remotes "At-A-Glance"		
RainSensor™ Series	RESOURCES	
Climate Logic® Wireless Weather Sensing System32	Communications Directory	89
SR-1 Pump Start Relay	Formulas/Sprinkler Spacing and Precipitation Rate Formulas	
Flow Sensors	Conversion Factors/Friction Loss Formulas	
CRR (Contractor Residential Remote)	Friction Loss Characteristics	
Pro Max [™] Remote (Universal Maintenance Remote)40	Water Meter Pressure Loss Chart	
VALVEC	Slope Irrigation Chart	
VALVES	Wire Sizing	
Valves "At-A-Glance"42	VVII C 312111g	
2400/2600 Series "Jar-Top"		
205 Series		
2500 Series	Irritrol Mobile App	112
2700 Series Anti-Siphon (Electric & Manual)50		
311A Series Anti-Siphon52	Trade Warranty	113
2623DPR Series/300 Series (Valve Adapters)54		
200B Series56		
700 Series (UltraFlow®)58		
100 Series (Century PLUS)60		
100-S Series (Century PLUS Scrubber)62		
Drip Zone Valve Kits64		
OmniReg® (Modular Pressure Regulator)66		

EUNTROLLERS

The contractor's choice for more than 30 years, Irritrol[®] controllers are user-friendly and easy to program. Names such as Rain Dial[®], Total Control[®], MC-E and Rain Master[™] are synonymous with dependability and quality. And with our revolutionary PCW Control product, we continue to redefine ease of use in irrigation control.

AT-A-GLANCE			Esta O			
	KWIKDIAL® pgs 4-5	RAINDIAL®-R pgs 6-7	JR MAX™ pgs 8-9	JUNIOR™ DC pgs 10-11	TOTAL CONTROL®-R pgs 12-13	PC W CONTROL pgs 14-17
STATIONS	4, 6, 9, 12	6, 9, 12	6, 8	4, 6, 8	6, 9, 12, 15, 18 & 24	12, 24, 36, 48
PROGRAMS	3 Independent	3 Independent	3 Independent	3 Independent	4 Independent	N/A
START TIMES	9	9	7	7	16	120
INDOOR LOCATION	•	•	•	•	•	•
OUTDOOR LOCATION	•	•	•	•	•	•
WATER BUDGETING	•	•	•	•	•	•
ELECTRONIC CIRCUIT BREAKER	•	•	•	•	•	•
AUTOMATIC, ET-BASED	Climate Logic® Option	Climate Logic® Option			Climate Logic® Option	
REMOTE READY	•	•			•	•
COMPUTER-BASED (PC) PROGRAMMING						•
UPDATES WITH ONLINE WEATHER						•
CLIMATE LOGIC® COMPATIBLE	•	•			•	
WARRANTY	3 years	5 years	2 years	2 years	5 years	5 years (90 days, software)

AT-A-GLANCE	MC-E "Blue" pgs 18-19	IBOC® PLUS pgs 20-21	SENTAR II™ pgs 22-23	RAIN MASTER® EAGLE™ pgs 24-25	RAIN MASTER® TWICE™2-WIRE pgs 26-27
ET-BASED WATER SAVINGS	Climate Logic® Option			•	•
CENTRAL CONTROL	-			•	•
WEATHER STATION INTERFACE	•			•	•
MAXIMUM STATIONS	48	12	36	36	36
NUMBER OF PROGRAMS	8	3	4	4	4
NUMBER OF START TIMES	48	24	5	5	5
MAXIMUM STATION RUNTIME	10 hrs	23 hrs. 59 mm	9:59 hh:mm	9:59 hh:mm	9:59 hh:mm
INTER-STATION DELAY TIME	•		1-255 Sec	1-255 Sec	1-255 Sec
ODD/EVEN DAY WATERING	•	•		•	Rain Master Eagle
WATER BUDGET (%)	0-255%	•	0-300%	0-300%	0-300%
CYCLE AND SOAK PROGRAMMING			•	•	•
SKIP DAY PROGRAMMING OPTION	•	•	•	•	•
PROGRAMMABLE RAIN DELAY	1-14 Days	•	1-7 Days	1-7 Days	1-7 Days
RAIN/FREEZE SENSOR INPUT	•	•	1	1	1
AUDIBLE MALFUNCTION ALARM	•		•	•	•
STATION HIGH FLOW MONITORING/ALERT	•		•	•	•
MAIN LINE FLOW MONITORING/ALERT	•		•	•	•
STATION NO FLOW ALERT				•	Rain Master Eagle
RAIN SENSOR BY PROGRAM		•	•	•	•
BATTERY REQUIREMENTS	None	Battery Powered	None	None	None
BUILT-IN REMOTE INTERFACE	•		•	•	•
TWICE-2 WIRE COMPATIBLE					Rain Master Eagle
SOLAR POWER OPTION		•			
WARRANTY	5 years	5 years	5 years	5 years	2 years







4, 6, 9 AND 12 STATION OUTDOOR/INDOOR

KwikDial[®], the ideal residential controller from Irritrol[®], offers a unique combination of sophisticated features and simple operation. Excellent scheduling flexibility is provided by its automatic, semi-automatic and manual operations, a wide range of watering intervals, and the ability to make percentage changes to watering duration for seasonal adjustments. Peace of mind is ensured by the controller's electrical surge protection, a self-diagnostic, electronic circuit breaker and built-in memory that maintains time, date and programming information for 24 hours in the absence of AC power. Now, when automatically adjusted by Irritrol's new, optional CLIMATE LOGIC[®] Weather Sensing System, the KwikDial becomes a smart, climate-based controller. (See CLIMATE LOGIC page)

KEY FEATURES & BENEFITS

CLIMATE LOGIC® COMPATIBLE

Automatically adjusts KwikDial watering based on the weather

THREE INDEPENDENT PROGRAMS

Allows differing watering days, start times, station run times and station assignments

MULTIPLE WATERING DAY OPTIONS

Provides flexibility to meet water restrictions and diverse plant requirements:

- Days-of-the-week watering
- Odd/even date watering with 31st day skip
- Repeating-day-interval watering (every day, every 2nd day, every 3rd day, etc., up to once every 31 days)
- Excluded-day option, when used with the odd/ even day or day-interval

COMPATIBLE WITH CRR SERIES HAND-HELD REMOTE SYSTEM

Provides convenient remote station start/pause/resume/off capability (R-100-KIT) for supplemental watering or inspection

SELF-DIAGNOSTIC, ELECTRONIC CIRCUIT BREAKER

Identifies and overrides an electrical "short" in a valve or in valve wiring and continues to water operable stations

FULL FAMILY OF INDOOR AND OUTDOOR MODELS

Ensures a product to match any landscape

SENSOR HOOKUP WITH BYPASS SWITCH COMPATIBLE WITH IRRITROL'S RAINSENSOR™ SERIES

Saves water by shutting off the system during rain

PROGRAM STACKING FEATURE

Prevents program overlap

ELECTRICAL SURGE PROTECTION (ON BOTH INPUT AND OUTPUT LINES)

Resists damage from lightning storms and power surges





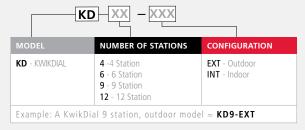


- Any-day-of-the-week watering
- 2 Odd/Even day watering
- 3 Day interval watering from 1-31 days
- 4 Up to 3-starts per day per program

CLIMATE LOGIC® COMPATIBLE



SPECIFYING INFORMATION



ADDED FEATURES

- Automatic, semi-automatic (manual program) and manual station(s) operation
- Programmable "Rain Off" up to seven days
- One dial and four push buttons for ease of programming
- Large LCD displays status of programs scheduled to run each day
- Multiple language capabilities (English, French, German, Italian and Spanish)
- Built-in memory maintains real time and programming information for a minimum of 24 hours in the absence of AC power (no battery required)
- "All stations" test program
- Water budgeting feature for each program (0-200% in 10% increments)
- Weather-resistant plastic case with internal transformer (outdoor model) and provision on door for a padlock
- Durable plastic case with plug-in transformer (indoor model)
- Three-year warranty

OPERATING SPECIFICATIONS

- Station run times: 1-240 minutes (4 hours) in 1-minute increments
- Start times: 3 per program for up to 9 daily starts

ELECTRICAL SPECIFICATIONS

- Transformer input: 120 V ac, 60HZ (220/240 V ac, 50 Hz)
- Transformer output: 24 V ac, .830 amps
- Maximum output per station: 24 V ac, .4 amp
- Maximum total output: 24 V ac, .8 amp (including master valve)
- Capacity: One station valve plus a master valve (or 24 V ac pump start relay) on at a time
- UL and CUL listed

MODELS

Model	Description
KD4-EXT	4 -Station Outdoor
KD6-EXT	6 -Station Outdoor
KD9-EXT	9 -Station Outdoor
KD12-EXT	12 -Station Outdoor
KD4-INT	4 -Station Indoor
KD6-INT	6 -Station Indoor
KD9-INT	9 -Station Indoor
KD12-INT	12 -Station Indoor

DIMENSIONS

- Outdoor: H: 9", W: 6 7/8", D: 4"
- Indoor: H: 8 ⁷/8", W: 6 ¹/8", D: 3"

- RS1000 wireless RainSensor™
- RFS1000 wireless rain/freeze sensor
- RS500 wired RainSensor™
- CRR remote series (R-100-KIT)
- SR-1 pump start relay
- CL-100-Wireless Weather Sensing System









6, 9, AND 12 STATION OUTDOOR/INDOOR

In addition to the numerous upgrades built into this popular, long-standing controller, the optional CLIMATE LOGIC® Wireless Weather Sensing System makes the Rain Dial-R a "smart" controller on the cutting edge of water management. When governed by Climate Logic, the Rain Dial-R will automatically water more on warm or hot days and less on cooler days. Applying the right amount of water to maintain a healthy landscape, the Rain Dial-R and weather-based Climate Logic Weather System seriously reduce overwatering and its expense.

KEY FEATURES & BENEFITS

CLIMATE LOGIC READY

Automatically reschedules Rain Dial-R watering based on the weather

REMOTE CONTROL READY

Compatible with CRR (Contractor Residential Remote) remote series

RAINSENSOR™ READY

Sensor bypass switch and terminal for sensor hookup

THREE INDEPENDENT PROGRAMS

Programming flexibility to meet the needs of a wide variety of plant material on the landscape site

THREE WATER DAY CHOICES

- Any day of the week, skip days or odd/even dates
- Skip days and odd/even dates have day exclusion option

WATER BUDGETING

For quick changes to the watering durations of all stations on a program at one time or pre-set a change in water budget for each month.

365-DAY CALENDAR FOR ODD/EVEN DATE WATERING

Meets the odd/even date watering mandates often used for landscape water reductions

WATER WELL RECOVERY (DELAY BETWEEN STATIONS)

Option of pump circuit ON or OFF during delay

MASTER VALVE/PUMP START CIRCUIT ASSIGNABLE PER STATION

Stations requiring a booster pump can be supplied while other stations can run on street water pressure

TEST ALL STATIONS PROGRAM

Allows a quick test of all stations from lowest to highest number

CLEAR/ERASE MEMORY BY PROGRAM

Saves time by quickly erasing only the program desired

PROGRAM STACK OR OVERLAP OPTION

Allows three programs/stations on at once or restricts operations to no overlapping station runs

SNAP-OUT FACE PANELS

6, 9 and 12-station models all have 12-station terminal boards allowing interchangeable front panels to change station number

MANUAL STATION ADVANCE

During automatic, semi-automatic and station test cycles, allows quick advancement of operation up through the stations



CLIMATE LOGIC® COMPATIBLE



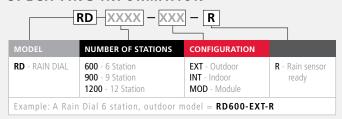
REMOTE CONTROL COMPATIBLE



Irritrol's Contractor Residential Remote (CRR) plugs into the Rain Dial-R face panel and connects to 24-Volt AC terminals.

For 1-person maintenance and trouble shooting, the CRR can operate individual stations on the Rain Dial-R from a range up to $1\frac{1}{2}$ miles.

SPECIFYING INFORMATION



ADDED FEATURES

- Automatic, semi-automatic and manual operation
- Weather-resistant plastic, key-lock cabinet with an internal transformer (outdoor models)
- Durable plastic cabinet with an external transformer (indoor models)
- Electrical surge protection (on both input and output lines) resists damage from lightning storms and power surges
- Self-diagnostic circuit breaker
- Wall-mountable
- Five-year warranty

OPERATING SPECIFICATIONS

- Station run times: 1-59 minutes in 1-minute increments or 1-5.9 hours in .1-hour (6 minute) increments
- Start times: 3 per program per day for 9 starts total
- Watering schedules per program:
 - Any day of the week
 - Skip days from 1 to 31 days between irrigation days
 - Odd or even date watering

ELECTRICAL SPECIFICATIONS

- Transformer input: 120V ac, 60Hz (220/240V ac, 50Hz available internationally)
- Transformer output: 24V ac, 1.25 amps
- Maximum output per station: 24V ac, .5 amps
- Maximum output to valves: 24V ac, 1.0 amps (including master valve/pump start circuit)
- Battery backup for "armchair" programming and keeping current time and date: 9-volt alkaline (not included)
- UL and CSA listed

MODELS

Model	Description
RD600-EXT-R	6 -Station, Outdoor
RD900-EXT-R	9 -Station, Outdoor
RD1200-EXT-R	12 -Station, Outdoor
RD600-INT-R	6 -Station, Indoor
RD900-INT-R	9 -Station, Indoor
RD1200-INT-R	12 -Station, Indoor
RD6-MOD-R	Module assembly, 6 -Station
RD9-MOD-R	Module assembly, 9 -Station
RD12-MOD-R	Module assembly, 12 -Station

DIMENSIONS

Outdoor: H: 7 ¾", W: 10 ¾", D: 4"
Indoor: H: 7 ¾", W: 7", D: 3 ¾"

- RS1000 wireless RainSensor™
- RFS1000 wireless rain/freeze sensor
- RS500 wired RainSensor™
- SR-1 pump start relay
- CRR remote series (R-100-KIT)
- R102-5476 (16x20 pin adapter) cable
- CL-100-Wireless Weather Sensing System









6 AND 8 STATION, OUTDOOR/INDOOR

The Irritrol[®] Junior Max (JR MaxTM) controllers combine simplicity and affordability with a host of modern irrigation control features ideal for residential landscape applications. Built for today's water use challenges, the JR Max offers a 365-day calendar for optional odd or even date watering as well as any-day-of-the-week and repeating day interval water day capabilities. This irrigation flexibility is further enhanced by three programs, up to seven start times per day and station timing from 1 minute up to 4 hours. Program "C" even has a "looping cycle" for "grow in" periods for sod, seed or misting applications.

KEY FEATURES & BENEFITS

THREE INDEPENDENT PROGRAMS WITH START-TIME STACKING

Provide the convenience of three controllers in one

PROGRAM "C" CAN BE SET TO A LOOPING FUNCTION

Provides continuous moisture for "grow in" (Loop can also be set in seconds)

SELF-GUIDED PROGRAMMING

Simplifies programming by prompting the user through irrigation scheduling

MULTIPLE WATERING DAY OPTIONS

Provides flexibility to meet water restriction requirements:

- 365-day calendar for true odd/even watering
- Odd/even date watering with 31st day skip
- 7-day calendar or up to 14 day intervals

PROGRAM REVIEW FEATURE

Ensures quick programming check and operation review

RUGGED, LOCKABLE, WEATHER-RESISTANT CABINET ON OUTDOOR MODELS

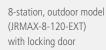
For installation flexibility



AVAILABLE IN INDOOR AND LOCKING OUTDOOR MODELS

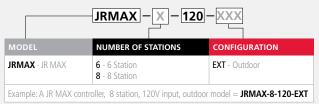


6-station, Indoor model (JRMAX-6-120) with flip-up cover





SPECIFYING INFORMATION



ADDED FEATURES

- Automatic, semi-automatic (to manually start preset programs) and multi-manual start operation
- Sensor port standard
- Built-in rain delay option
- "Armchair" programming allows programming without AC power
- Programmable master valve per program
- Electronic fuse protection
- Real-time battery backup maintains accurate time in the absence of AC power—a 9-volt battery (not included) must be installed for proper operation even under AC power.
- On-board coin cell battery maintains program up to five years
- Automatic safety backup program
- Multiple language capabilities (English, French and Spanish)
- Flip cover protects large LCD display (indoor models)
- Two-year warranty

OPERATING SPECIFICATIONS

- Station run times: 1 minute to 4 hours in 1-minute increments
- Start times: 3 starts for programs A and B, one start for program C in regular mode, unlimited starts in looping mode
- Watering schedule: calendar, interval, odd/even
- Water budgeting: 0-200% in 10% transformer output

ELECTRICAL SPECIFICATIONS

- Transformer input: 120 V a c, 60 Hz plug-in transformer; usETLc listed
- Transformer output: 24 V ac, 500 mA
- Maximum output per station: 24 V ac, .25 amp
- Maximum total output: 24 V ac, .5 amp
- Capacity: one station valve plus a master valve

MODELS

Model	Description
JRMAX-6-120-EXT	6 -Station, outdoor mount
JRMAX-8-120-EXT	8 -Station, outdoor mount
JRMAX-6-120	6 -Station, indoor mount
JRMAX-8-120	8 -Station, indoor mount

DIMENSIONS

• Outdoor: H: 7 ⁷/8", W: 6 ³/4", D: 3 ⁵/8" • **Indoor:** H: 4 ⁷/16", W: 5 ⁷/16", D: 1 ⁵/8"

- RS1000 wireless RainSensor™
- RFS1000 wireless rain/freeze sensor
- RS500 wired RainSensor™







1 AND 4 STATION, OUTDOOR/INDOOR

When AC power is a problem, the JUNIOR DC battery-operated controllers are the solution! Whether for temporary operations like irrigation system wire repairs or permanent applications where AC power to the valves is expensive or impractical, the JUNIOR DC controllers can handle the job. And because valve boxes occasionally flood, these valve-mounted controllers are waterproof! For water savings, JUNIOR DC controllers are compatible with wired rain sensors.

KEY FEATURES & BENEFITS

BATTERY-OPERATED

Provides automatic irrigation in areas withour A.C. power

WATERPROOF (IP68)

To survive the occasional flooded valve box

VALVE MOUNT OR WALL MOUNT OPTION

Mount right on the D.C. solenoid or wall mount up to 900' away

1- AND 4-STATION MODELS

For temporary power to one valve or permanent power to a system without A.C.

COMPATIBLE WITH WIRED RAINSENSOR™

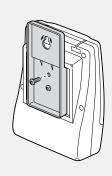
Saves water by preventing irrigation during a downpour

USE IRRITROL DCL, DC LATCHING SOLENOID

visit us at: www.irritrol.com

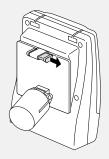


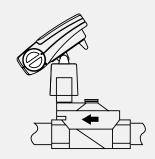
JUNIOR DC™ WALL INSTALLATION



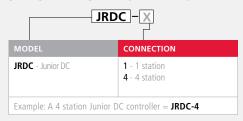


JUNIOR DC VALVE MOUNTED





SPECIFYING INFORMATION



ADDED FEATURES

- Battery operated
- Waterproof tested (IP68)
- Compatible with wired RainSensor™
- 1-station and 4-station models
- Valve-mounted on the solenoid or wall-mounted
- Two independent programs
- Program stacking (prevents overlapping operations)
- Program erase and total erase functions
- "Off" setting for rainy weather
- Low battery indicator
- 2-year waranty

OPERATING SPECIFICATIONS

- 3 start times per program
- Watering Time: 1-155 minutes (in 1-minute increments)
- Water Budgeting (10% to 200%)
- 7-day "select day" watering schedule or day intervals from 1-14 days

ELECTRICAL SPECIFICATIONS

- Uses one, 9-volt, Alkaline battery
- Output to solenoid is a DC pulse
- Use with Irritrol "DCL", DC, latching solenoids and Irritrol valves
- cULus listed
- Maximum wire length to DCL: 660' to 960' depending on wire gauge (see below)

Wire Size	Maximum Wire Length
#18	660 feet
#16	800 feet
#14	960 feet

MODELS

Model	Description
JRDC-1	1-station
JRDC-4	4-station

DIMENSIONS

• 1 station: H: 1 ¹/₂", W: 1 ³/₄", D: 3 ³/₄"

• **4 stations:** H: 1 ¹/₂", W: 1", D: 3"

OPTIONAL ACCESSORIES

RS500 wired RainSensor™

TOTAL CONTROL®R



6, 9, 12, 15, 18, 24, 36 & 48-STATION* OUTDOOR/INDOOR

The Irritrol® Total Control-R family of models is proof that advanced design controllers don't have to be complicated. Developed to meet a wide variety of watering requirements, the easy-to-program Total Control Series is available in models ranging from 6 to 48 stations. Programming flexibility is provided by four independent programs, 16 total start times and a 365-day calendar for odd/even day scheduling. And now, the Total Control-R has a weather-based option with Irritrol's new CLIMATE LOGIC®!

KEY FEATURES & BENEFITS

CLIMATE LOGIC® COMPATIBLE

Turn the Total Control into a weather-based controller using an on-site wireless weather sensor.

NEW "R" MODELS ARE REMOTE-READY

For Irritrol's Contractor Residential Remote (CRR) series

FOUR INDEPENDENT PROGRAMS OFFER CONCURRENT OPERATION CAPABILITY

For scheduling flexibility

SEVEN-DAY CALENDAR, ODD/EVEN DAY OR DAY-INTERVAL OPTIONS FROM ONE TO 30 DAYS

Provides the flexibility to meet water restrictions or plant watering requirements

PROGRAMMABLE MASTER VALVE ON/OFF PER PROGRAM

Provides the flexibility of running some programs with a booster pump and some without

NON-VOLATILE MEMORY

Holds program during power failures for reliable operation

FLEXIBLE STATION RUN AND START TIMES

Meet a broad range of watering requirements

6-, 9- AND 12-STATION MODELS HAVE 12-STATION TERMINAL BOARDS; 15-, 18- AND 24-STATION MODELS HAVE 24-STATION TERMINAL BOARDS

Allows for station count increase simply by changing face panel module $% \left(1\right) =\left(1\right) \left(1\right) \left($

SENSOR HOOKUP WITH BYPASS SWITCH COMPATIBLE WITH THE IRRITROL RAINSENSOR™ SERIES

Saves water by shutting off the system during rainfall

NEW 36 AND 48-STATION MODELS

For irrigating larger landscapes

visit us at: www.irritrol.com

^{*15-, 18-, 24-, 36-} and 48-station controllers are available in outdoor models only



ADDED FEATURES

- User-friendly, 10-position programming dial and large, easy-toread display
- Excluded-day option, when used with the odd/even date option, allows selection of specific day(s) not to water
- 365-day calendar for odd/even day programming
- Start time stacking within each program
- Programmable "Rain Off" up to seven days
- Automatic, semi-automatic, manual and timed-manual operation
- Self-diagnostic circuit breaker
- Electrical surge protection (on both input and output lines)
- Durable plastic cabinet with an external transformer (indoor models)
- Wall-mountable
- Five-year warranty

CLIMATE LOGIC® READY!

Make Total Control-R a weather-based controller with automatic water budget adjustments, every day, with the Climate Logic Wireless Weather Sensing System.



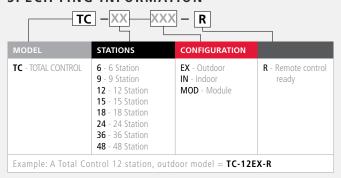
Easy connection to the back of timing module allows quick plug-in of the CLIMATE LOGIC® receiver module.

36-and 48-STATION MODELS AVAILABLE!



- · Commercial-grade, lockable, metal cabinet
- Full size terminal strips
- Electrical surge protection.

SPECIFYING INFORMATION



OPERATING SPECIFICATIONS

- Station run times: 1 minute to 10 hours in 1-minute increments
- Start times: 16 total starts assignable to any program
- Water budgeting: 10-200% in 10% increments

ELECTRICAL SPECIFICATIONS

- Electronic circuit breaker: 1.25 amps minimum holding
- Maximum output per station: 24 V ac, .5 amp
- Maximum output to valves: 24 V ac, 1.25 amps (including master valve)
- Battery backup: 9-volt alkaline battery (not included)
- UL and CSA listed (6-, 9-, 12-, 15-, and 18-station models)
- UL and CUL listed (24, 36, & 48-station models)

Outdoor

- Transformer input: 120 V ac, 60 Hz (220/240 V ac, 50 Hz)
- Transformer output: 24 V ac, 1.67 amps

• Indoor

- Transformer input: 120 V ac, 60 Hz (220/240 V ac, 50 Hz)
- Transformer output: 24 V ac, 1.25 amps

MODELS

Model	Description
TC-6EX-R	6 -Station Outdoor
TC-9EX-R	9 -Station Outdoor
TC-12EX-R	12 -Station Outdoor
TC-15EX-R	15 -Station Outdoor
TC-18EX-R	18 -Station Outdoor
TC-24EX-R	24 -Station Outdoor
TC-36EX-R	36 -Station Outdoor (metal cabinet)
TC-48EX-R	48 -Station Outdoor (metal cabinet)
TC-6IN-R	6 -Station Indoor
TC-9IN-R	9 -Station Indoor
TC-12IN-R	12 -Station Indoor
TC-6MOD-R	Module assembly, 6 -Station
TC-9MOD-R	Module assembly, 9 -Station
TC-12MOD-R	Module assembly, 12 -Station
TC-15MOD-R	Module assembly, 15 -Station
TC-18MOD-R	Module assembly, 18 -Station
TC-24MOD-R	Module assembly, 24 -Station

DIMENSIONS

- Outdoor: H: 8 ¹/₂", W: 10 ¹/₂", D: 5"
- **Indoor:** H: 7 ¹/₂", W: 9 ¹/₂", D: 4 ¹/₄"
- **Metal:** (36 & 48-station) H: 15 ³/₄", W: 10 ³/₄", D: 5 ³/₄"

- RS1000 wireless RainSensor™
- RFS1000 wireless rain/freeze sensor
- RS500 wired RainSensor™
- SR-1 pump start relay
- CRR remote series (R-100-KIT)
- CL-100-Wireless Weather Sensing System







12 STATION OUTDOOR/INDOOR (expandable to 48-station)

The first of its kind, Irritrol's computer-controlled residential controller increases the professional installer's sales, installation and service productivity while providing the highest level of end-user convenience.

KEY FEATURES & BENEFITS

PC-COMPATIBLE SCHEDULING SOFTWARE

User-friendly software that is precise, flexible, and intuitive with its computer interface

2-WAY HANDHELD REMOTE WITH DESKTOP STAND

Provides the convenience of wirelessly programming the controller in the garage from the desk in the user's home office or den.

SCHEDULING ADVISOR™

Saves water automatically by adjusting the irrigation schedule when set to receive the online weather data

INTERNET COMPATIBILITY

14

Allows the owner to send schedules over the Internet. The installer or Irritrol Tech Support can alter the program and return it to the client

12-STATION CONTROLLER WITH 2-WAY RADIO MODULE

Acknowledges the receipt of a new program, stores it in memory and automatically runs it according to schedule. Controller installation and field wire hookup are the same as a conventional controller

SELECTABLE PERSONAL ID NUMBER (PIN)

Unique, selectable number for each system's security prevents overlapping instructions from another PCW Control system and reduces the chance of unauthorized program entry

SYSTEM EXPANDABILITY UP TO 48 STATIONS

To meet the need for larger systems, 12-station indoor or outdoor "add-on" controllers within range of the 2-way radio modules can be added. The system sees station #1 on the second controller as zone #13

LANDSCAPE LIGHTING CONTROL

Allows up to 3 zones to be designated to run relays for control of landscape lighting. (Controller does not supply main power to the lighting.) SR-1 Pump Start Relay is recommended

CONTRACTOR SETTINGS DEFAULT

With a click of the mouse, the owner can reactivate the installer's original program

visit us at: www.irritrol.com



AVAILABLE IN BOTH INDOOR AND OUTDOOR MODELS





Indoor model

Outdoor model

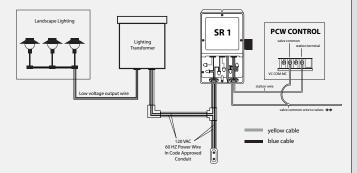
EASY SYSTEM EXPANSION UP TO 48 STATIONS



Up to four controllers can be spaced throughout the property

CONTROL LANDSCAPE LIGHTING, TOO!

WIRING DIAGRAM FOR LANDSCAPE LIGHTING ZONE



OPERATING SPECIFICATIONS

- Station run time: up to 24 hours (in hour and minute increments)
- Programs: 10 per zone (120 total)
- Watering day schedules selectable per zone:
 Any days-of-the-week watering, interval watering (selectable in 1-day increments) from daily to once every 30 days and Odd or Even date watering
- Day exclusion option for setting "non-water" days
- Hour exclusion option for daily non-watering hours
- Optional RainSensor™ for multi-controller systems: Connect sensor to controller #1
- RainSensor[™] assignable per station
- Optional pump start relay for multiple controller systems: connect relay to controller #1 (for pump control)
- PIN number range: selectable from 0001 to 9999
- Range of two-way remote: 1,000' line-of-sight, less when obstructed or experiencing interference
- Customized semi-automatic programs
- For contractors: stores multiple customer's schedules

ELECTRICAL SPECIFICATIONS

- Transformer input: 120 V ac, 60HZ
- Transformer output: 24 V ac (30VA)
- Maximum output per station: 24 V ac, .4 amp
- Maximum total output: 24 V ac, 1 amp (including master valve)

MODELS

<u>Model</u>	Description
PCW-12-INT-PAK	12-Stn. indoor controller, remote, disk
PCW-12-ADD-INT	12-Stn. add-on controller (indoor)
PCW-12-EXT-PAK	12-Stn. outdoor controller, remote, disk
PCW-12-ADD-EXT	12-Stn. add-on controller (outdoor)
PCW-R	Remote, stand, USB cord and disk

DIMENSIONS

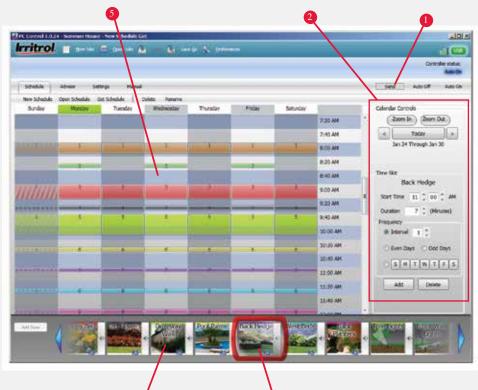
- Outdoor: H: 13", W: 7", D: 4 1/4"
- Indoor: H: 12 ¹/8", W: 6 ¹/8", D: 3"

SYSTEM REQUIREMENTS

- Windows-compatible PC
- Windows XP Home Edition, XP Professional, Vista or Windows 7 (must have Microsoft .NET Frameworks 3.5 or later)
- Available USB 1.0 (or greater) port
- 900 MHz CPU
- 64 MB RAM and CD-ROM drive
- 20MB free hard disk space
- 1024 x 768 64k color display/monitor (800 x 600 minimum)
- Keyboard and pointing device (mouse)
- Internet connectivity (high speed)

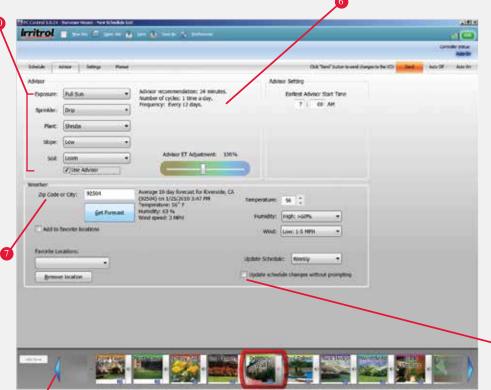


EXPERIENCE THE SIMPLICITY OF PCW CONTROL.



- Send changes to the controller
- Back Hedge" watering schedule:
 - Start: 11:00 am

 - Run: 7 minutes Day interval "1" (every day)
 - Odd or even water day option
 - Week day watering option
- Current zone selection "Back hedge"
- 4 Zone buttons with digital photos of each zone
- 5 Scheduling calendar:
 - Shows each zone's:
 - Water days
 - Start time
 - Watering duration
 - Drag and drop zones on the calendar with your cursor



- Provides a recommended watering program each time it receives a weather update
- Enter zip code and send for online weather data
- 8 Move zone buttons for selection
- 9 Automatically update schedule using weather information just received
- 10 Enter site-specific information for each zone





EASY MAINTENANCE USING HAND-HELD REMOTE



Easy system maintenance or troubleshooting using the convenient hand-held remote. Make on-site schedule changes with your laptop and remote without garage access.

CUSTOMIZE YOUR SEMI-AUTOMATIC PROGRAMS



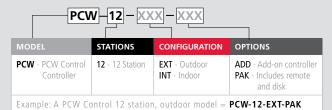
OPTIONAL ACCESSORIES

- SR-1 pump start relay
- RS1000 wireless RainSensor™
- RFS1000 wireless rain/freeze sensor
- RS500 wired RainSensor™

LATEST SOFTWARE UPDATE

- Software version: On HELP page, click on UPDATES for latest version of software
- Send individual schedules over the Internet
- Diagnostic circuit breaker alerts user to short circuits right on zone photos
- Available as a FREE online upgrade

SPECIFYING INFORMATION





PCW-12-INT-PAK (includes transformer)









4, 6, 8, 12, 18, 24, 30, 36, 42 AND 48 STATION, OUTDOOR/INDOOR

We've taken the industry standard for commercial irrigation control and made it better. The Irritrol[®] MC-E, in it's rugged, lockable, vandal-proof steel cabinet, now boasts a modernized feature set that includes; the scheduling versatility of 8 independent programs, state-of-the-art flow monitoring, program looping, and new blue face panels. And now, the MC-E blue model is compatible with Irritrol's new CLIMATE LOGIC[®] Wireless Weather Sensing System to automatically adjust the controller's program based on each day's weather. We've also added a 48-station model to the family. From small to large landscapes, the new MC-E has got what it takes to meet the growing demands of today's commercial irrigation applications.

KEY FEATURES & BENEFITS

CLIMATE LOGIC® COMPATIBLE

On-site wireless weather sensing option

FLOW MONITORING WITH DIAGNOSTICS AND 3 TYPES OF ALARMS (requires station #1 for a N/O master valve circuit)

Protects the system and saves water by detecting, reporting and handling high flow and unscheduled flow events

MODELS WITH STATION COUNTS FROM 4 UP TO 48

Provides irrigation control for any size project

COMMERCIAL-GRADE, HEAVY-DUTY, LOCKABLE, WEATHER RESISTANT CABINETS AND PEDESTALS

For long service life in demanding commercial and "heavy turf" applications

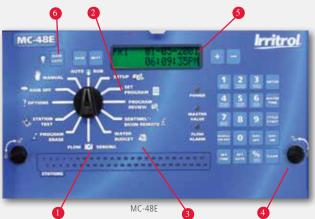
BACKWARD COMPATIBLE FACE PANEL TO EXISTING MC PLUS-B CABINETS ON SITE

Allows field upgrades to the new MC-E while leaving cabinet/pedestal in place

visit us at: www.irritrol.com







- Flow monitoring and diagnostics
- 2 Eight independent programs
- Global water budget
- 4 Quick-disconnect face panel
- 32-character, dot matrix LCD display
- 6 LCD backlight

CLIMATE LOGIC® COMPATIBLE



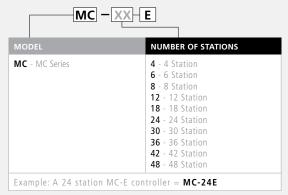
Optional CLIMATE LOGIC one month view.

EASY UPGRADE TO MC-E (blue)



Includes a lower access panel with each MC-E-PAN

SPECIFYING INFORMATION



ADDED FEATURES

- Backlit, 2-line, 32 character, dot matrix LCD display
- Terminals for flow sensor, stop sensor and start sensor
- Password protection option for programming schedules
- Optional remote alarm to warn of an undesirable flow event
- "Super Cap" to maintain time/date up to 48 hours (no battery required)
- Looping option per program (Start Time, Stop Time & Delay between loops)
 Pump/MV option of ON or OFF during delay
- Flow sensing based on Irritrol® or Data Industrial PVC-TEE mounted flow sensor models & sizes
- Quick disconnect face panel
- Five-year warranty

OPERATING SPECIFICATIONS

- Watering day cycles per program:
 - Any days of the week
 - Odd or Even date watering
 - Day intervals from 1- 60 days
- Station run times:
 - 0-59 seconds in 1-second increments
 - 1 minute to 24 hours in 1-minute increments
- Global water budget:
 - 0% to 255% in 1% increments

ELECTRICAL SPECIFICATIONS

- Transformer input: 120V ac, 60 Hz
- Transformer output: 24V ac, 2.08 amps (50 VA)
- Maximum output per station: 24V ac, 1.24 amps
- Maximum output to valves: 24V ac, 1.68 amps (including master valve)

MODELS

Model	<u>Description</u>
MC-4E	4 -Station, wall mount, fits P-2B Pedestal
MC-6E	6 -Station, wall mount, fits P-2B Pedestal
MC-8E	8 -Station, wall mount, fits P-2B Pedestal
MC-12E	12 -Station, wall mount, fits P-2B Pedestal
MC-18E	18 -Station, wall mount, fits P-6B Pedestal
MC-24E	24 -Station, wall mount, fits P-6B Pedestal
MC-30E	30 -Station, wall mount, fits P-6B Pedestal
MC-36E	36-Station, wall mount, fits P-6B Pedestal
MC-42E	42 -Station, wall mount, fits P-6B Pedestal
MC-48E	48 -Station, wall mount, fits P-6B Pedestal

DIMENSIONS

• **4-12 Station:** H: 9 ³/₄", W: 10 ¹/₂", D: 4 ¹/₄" • **18-48 Station:** H: 12", W: 14 ¹/₄", D: 4 ³/₄"

- CL-100-Wireless Weather Sensing System
- RS1000 wireless RainSensor™
- RFS1000 wireless rain/freeze sensor
- RS500 wired RainSensor™
- Pedestal mounts (P-2B: 4- to 12-station models; P-6B:18- to 48-station models)
- SR-1 pump start relay
- CRR remote series (R-100-KIT)
- PVC-TEE flow sensors









4, 8 AND 12 STATION, OUTDOOR

Designed to control commercial irrigation systems with no A.C. power, the Irritrol[®] IBOC[®] Plus controller operates with a battery or it's optional SPC-2 solar power converter. For dependable performance in commercial applications, the IBOC Plus features a steel cabinet and key/lock door as well as an optional steel locking pedestal for free-standing installations.

KEY FEATURES & BENEFITS

BATTERY, 6V DC POWER OR OPTIONAL SOLAR POWER

Provides operation in areas with no AC power

COMMERCIAL-GRADE, LOCKABLE STEEL CABINETS AND PEDESTALS

For vandal resistance and longer service life

THREE INDEPENDENT PROGRAMS

Offer concurrent operation capability and scheduling flexibility

ODD/EVEN DAY CALENDAR WITH DAY EXCLUSION; SEVEN-DAY CALENDAR; OR ONE TO 62 SKIP DAYS

To match water restrictions and varied plant water requirements

NON-VOLATILE MEMORY

Retains all program data for reliable operation

PROGRAM CYCLE LOOPING

20

Provides continuous program repeat operation within a selectable watering window for "grow in" periods

SOLAR OPTION

Solar power converter can be mounted up to 80 feet from IBOC Plus (SPC-2 option, sold separately)

Simple mounting on top of any IBOC Plus controller model or mounted up to 80 feet from the controller

Maintenance-free gel cell battery: (3-year life) inside solar converter

Solar load ratio: 6-to-1 (provides full power to IBOC Plus with only two hours of direct sunlight per day)

Output: 25-27 V dc/50mA

Solar amp/hrs. per day: 600mA, typical **Load amp/hrs. per day:** 100mA, typical

Operation temperature: -22° F to $+140^{\circ}$ F (-30° C to $+60^{\circ}$ C) Storage temperature: -40° F to $+185^{\circ}$ F (-40° C to $+85^{\circ}$ C)

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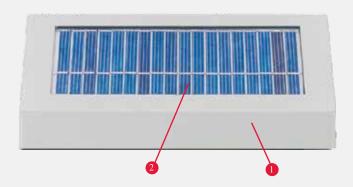


Wire size (Awg)	16	14	12	
Distance (ft.)	30	50	80	

CONTROLLERS TO VALVES

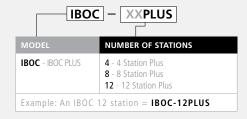
Wire size (Awg)	20	18	16	14	12
Distance (ft.)	400	600	1000	1600	2400

OPTIONAL SOLAR POWER CONVERTER (SPC-2)



- 1 Vandal-resistant, metal housing
- 2 Internal maintenance-free gel-cell battery

SPECIFYING INFORMATION



PEDESTAL OPTIONS



PEDESTAL - P-2B

H: 27 ⁵/8", W: 10 ³/4", D: 3 ¹/4", WT: 11 lbs

PEDESTAL - P-6B

H: 35", W: 14 ¹/4", D: 4 ¹/₁₆", WT: 21 lbs

ADDED FEATURES

- Programmable "Rain Delay" postpones automatic operation for up to 30 days
- Program review and erase
- Large, easy-to-read LCD displays English or Spanish
- One- to 10-minute programmable test cycle
- Fully programmable manual cycle acts like a fourth temporary program
- Selectable, programmable master valve
- 365-day calendar with automatic leap year adjustment
- Start-time stacking within each program
- Station stacking for up to three stations plus master valve at one time
- Enhanced lightning protection
- Electronic circuit breaker detection for open and shorted conditions
- Battery capacity displayed in remaining percentage
- Optional RainSensor™ input selectable by program
- Five-year warranty

OPERATING SPECIFICATIONS

- Station run times: 1-minute to 23 hours, 59 minutes
- Start times: 8 per program for up to 24 daily starts
- Watering schedule: 7-day calendar, odd/even day with day exclusion or 1-62 skip days
- Water budgeting: 10-200% in 10% increments

ELECTRICAL SPECIFICATIONS

- Powered by one 6-volt alkaline battery (not included) or one SPC-2 (solar power converter) sold separately
- Output: 24 V DC latching
- Master valve output 24 V DC latching
- Rain sensor input selectable per program
- Irritrol[®], Hardie[®] and Richdel[®] valves must be converted from AC with 24 V DC latching solenoids (DCL)
- Maximum operating pressure: 120 psi

MODELS

Model	Description
IBOC-4PLUS	4 -Station, fits P-2B Pedestal
IBOC-8PLUS	8 -Station, fits P-2B Pedestal
IBOC-12PLUS	12 -Station, fits P-2B Pedestal

DIMENSIONS

- **IBOC Plus:** H: 9 ¹/₄", W: 10 ³/₄", D: 5 ¹/₄"
- **SPC-2:** H: 4 ⁹/₁₆", W: 10 ³/₄", D: 3 ³/₈"

- RS500 wired RainSensor™
- P-2B standard pedestal
- SPC-2 Solar power converter (includes batteries)
- DCL DC latching solenoid





6, 12, 18, 24, 30 AND 36 STATION, OUTDOOR/INDOOR

The Sentar II has long been noted as the "workhorse" of irrigation controllers. It offers advanced control features for a fraction of the cost of similar models. Designed with the irrigation manager in mind, the Sentar II protects landscapes by offering; rain sensing, flow sensing, and cycle and soak scheduling on any of 4 fully independent programs.

KEY FEATURES & BENEFITS

FOUR INDEPENDENT PROGRAMS

Five start times for a total of 20 possible start times per day

COMMERCIAL-GRADE, LOCKABLE STEEL & STAINLESS STEEL CABINETS AND PEDESTALS

For vandal resistance and longer service life

CYCLE AND SOAK

To eliminate runoff and conserve water

SEVEN DAY WEEK OR SKIP-BY-DAY SCHEDULING

To match water restrictions and varied plant water requirements

NON-VOLATILE MEMORY

Retains all program data indefinitely during outages or shutdowns

PROGRAMMABLE OVERLAP PROTECTION

Allows programs to run one after the other (stack mode) or at the same time (no stack mode)

BUILT-IN REMOTE JACK

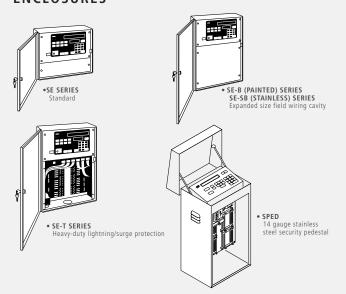
For use with Irritrol Pro $\mathsf{Max^{TM}}$ remotes and optional permanent mount receiver





- Flow sensing allows for total flow control and break detection (requires flow sensor)
- Watering time(s) for each station can be set from 1 minute to 9 hrs
 59 mins in 1 minute increments
- Quick Stations allow for rapid programming of a block of stations with the same watering time
- Water days for each program may be based on seven day week or a skip-by-day routine allowing a program to skip from 1 to 30 days between watering
- Programmable rain shut down allows the selection of the number of days (1 to 7) the controller will remain in rain shut down before restoring automatic watering
- A "real time" clock holds the actual time during power outages without batteries
- The Review feature brings all the information for a given program(s) to the displays with simple push of the Review Button
- Multiple displays provide a truly simple way of programming and information recall
- Manually activated program cycle to run a program independent of its programmed start time and water days
- Automatic field wire fault detection enables the controller to sense a short circuit in the field wire and instantly turn off that station, report the fault and move to the next programmed station. No fuses or reset button to be concerned with
- Manual Rain Switch (auto-off) turns off all stations without disturbing the program(s).
- Heavy-duty 18-gauge steel enclosure with powder coated finish. Also available in Stainless Steel
- Extra heavy-duty lightning and surge protected models available for areas where lightning is a concern
- Water budgeting by increasing or decreasing station run times in 1% increments from 0% to 300% by program
- Limited five-year warranty

ENCLOSURES



OPERATING SPECIFICATIONS

- Programmable master valve and pump allows the master valve or pump to be assigned to any program
- Programmable time delay between stations (from 1 to 256 seconds) permits slow-closing valves to fully close
- Programmable security code allows entry of a 1-4 digit number as a security code to prevent access by unauthorized personnel
- Programmable rain sensor can be assigned on a per program basis
- Programmable alarm to enable or disable an audible alert in the event of a field wire fault

ELECTRICAL SPECIFICATIONS

- Input power required: 105-130V ac, 50/60 Hz, 0.5 amp maximum, 0.1 amp idle
- Output power: 24V ac 1.5 amps maximum total output (36VA) 1 amp per station or master valve
- UL, CUL and FCC Approved

DIMENSIONS

• SE Series: 10" x 13" x 4 1/2"

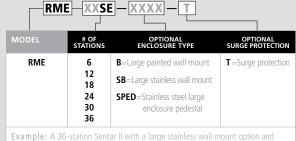
• SE-B & SB Series: 17 ½ " x 13" x 4 ½"

• RMPED-1: 16" x 34" x 16"

OPTIONAL ACCESSORIES

- PMRKIT: Permanent mount receiver kit for use with Pro Max™ remote
- RMPED-1: Outdoor pedestal

SPECIFYING INFORMATION



Example: A 36-station Sentar II with a large stainless wall mount option and surge protection = **RME36SE-SB-T**



RAIN MASTER® EAGLE™





6, 12, 18, 24, 30 and 36 STATION, OUTDOOR/INDOOR

The Rain Master Eagle™ combines classic controller programming with cutting edge features, including an optional weather station. Optimized for simplicity, the Eagle is ideal for use by ground maintenance personnel and landscape managers that require a fully automated, "Smart" ET weather-based irrigation controller.

KEY FEATURES & BENEFITS

FOUR INDEPENDENT PROGRAMS

With five selectable start times for a total of 20 possible irrigation cycles per day

WATER DAYS FOR EACH PROGRAM

Can be based on a seven-day cycle, a skip-by-day cycle or odd/even water days

PROGRAMMABLE MASTER VALVE

24

To utilize and control a master valve on a per program basis

CONFIGURABLE MASTER VALVE TYPE

To select either a normally open master valve or a normally closed master valve

EVAPOTRANSPIRATION (ET) BASED SCHEDULING

Maximizes water saving and irrigation efficiency

FLOW SENSING AND CONTROL

Monitors system flow and shuts off master valve when high flow occurs



ADDED FEATURES

Water Saving Features

- Evapotranspiration (ET) based scheduling.
- Flow sensing and control.
- Percentage adjustment on a per program basis (1%-300%, in 1% increments) to allow an increase or decrease of all station runtimes within that program.
- Programmable rain shut off in order to delay the start of irrigation after a rain storm.
- Manual rain switch (automatic watering no watering).
- Connectivity for any one of the following; rain, moisture or freeze sensor device.
- Selectable cycle-and-soak or conventional start times on a per-program basis.

Diagnostic and Fault Detection

- Automatic field wire fault detection enables the controller to sense a short in the field wire and instantly turn off that station.
- Non-volatile memory to retain the program(s) and controller information during power outages or seasonal shut downs.
- Intelligent resumption of program execution after power outages to ensure that program starts are not lost.

Convenience Features

- Keyboard layout is easy to understand and use; provides ease of use during programming and review.
- During program execution the controller displays the executing program number, the flow in GPM, and the station runtime countdown in hours, minutes and seconds.
- Programmable Controller Security Access code to prevent unauthorized use or modifications to the controller's program.

Flow Capabilities

- Automatic detection of main line water breaks.
- Automatic detection of unscheduled or no-flow water conditions.
- Automatic high-flow station alarm.
- Controller utilizes automatic LEARN mode for setting individual station flow limits.
- Intelligent flow-limit processing for concurrent station operation.
- Water usage meter indicates total water used by the controller.

EVAPOTRANSPIRATION (ET) FEATURES OF THE IRRITROL® RAIN MASTER® EAGLE™

- The ability to input and store Historical ET data on a monthly basis (12 months).
- The ability to use any one of four different ET sources as the basis for its ET calculations:
 - 1. Historical ET data
 - 2. Manually-entered ET data
 - 3. Rain Master ET measurement device or equivalent
 - Downloaded ET data from the Internet (requires optional Rain Master® iCentral™ hardware)
- The ability to automatically re-compute station runtime, utilizing the current ET information.
- Ability to display the current adjusted runtime as a percent of the base runtime for all ET-enabled programs.

OPERATING SPECIFICATIONS

- Four independently controllable irrigation programs with five selectable start times for a total of 20 possible irrigation cycles per day
- Water days for each program can be based on a seven-day cycle, a skip-by-day cycle or odd/even water days
- Programmable master valve to utilize and control a master valve on a per program basis.
- Configurable master valve type to select either a normally open master valve or a normally closed master valve
- Programmable pump independent of the master valve on a per program basis
- Programmable stacking or non-stacking operation of the programs

ELECTRICAL SPECIFICATIONS

- Input power required: 105-130 V ac, 50/60 Hz, 5 amp maximum, 1 amp idle
- Output power required: 24 V ac 1.5 amps maximum total output or (36 VA) 1 amp per station or master valve
- UL, CUL, and FCC approved

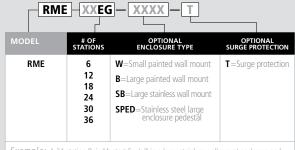
DIMENSIONS

- Station EG model: H: 10", W: 13", D: 4½"
- Station EG-B & SB model: H: 17½", W: 13", D: 4½"
- Station SPED model: H: 34", W: 16", D: 16"

OPTIONAL ACCESSORIES

- RM-WETHR-ETRS: Weather station for direct ET measurements
- Flow sensor (Brass & Plastic)
- Built-in remote control capability with Pro MaxTM Remote
- Heavy-duty lightning protection (T-optional)

SPECIFYING INFORMATION



Example: A 24-station Rain Master® Eagle™ in a large stainless wall mount enclosure and surge protection = **RME36SE-SB-T**



RAIN MASTER® TWICE™2-WIRE





UP TO 36 STATIONS, OUTDOOR/INDOOR

Unlike other two-wire systems, the Irritrol® Rain Master Twice 2-wire protocol provides a two-way communication link between the controller, decoders and valves. This provides the means for testing and diagnostic capabilities within the 2-wire system. The simplicity of the 2-wire field installation, coupled with the enhanced capability of the Rain Master 'E' series controllers, sets a new precedent for 2-wire control within the irrigation industry.

KEY FEATURES & BENEFITS

EVAPOTRANSPIRATION (ET) BASED SCHEDULING

Maximizes water saving and irrigation efficiency

FLOW SENSING AND CONTROL

Monitors system flow and responds to upper, lower, unscheduled and no flow conditions

2-WIRE INTERFACE MODULE

Provides 2-wire capability for any Irritrol Rain Master Eagle controller

DECODER TWO-WAY COMMUNICATION

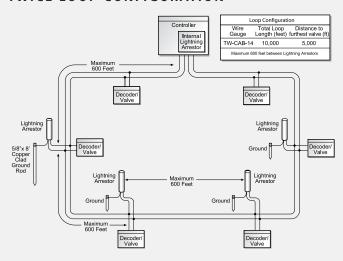
Provides troubleshooting diagnostics to retain system integrity

PROGRAMMABLE DECODERS

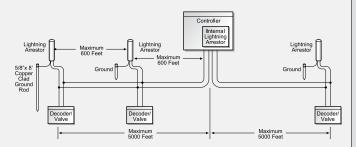
Provides flexibility in programming decoder identification



TWICE LOOP CONFIGURATION

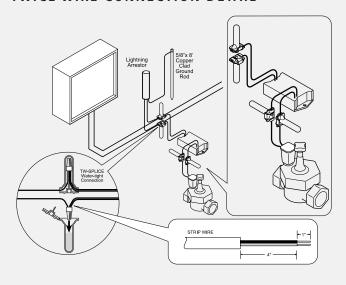


TWICE STRAIGHT LINE CONFIGURATION



Straight Line Configuration		
Wire Gauge	Total Wire Length (feet)	
TW-CAB-14	5,000	
Maximum 600 feet between Lightning Arrestors		

TWICE WIRE CONNECTION DETAIL



MODULES

- Easy-to-read LED status indication for every command
- LED also displays valve activation and diagnostic reporting
- Troubleshooting capabilities:
 - LED decoder "active" indication
 - LED valve power "on" indication
 - Two-way communication verification

DECODERS

- Each decoder has a unique address (programmable at the interface module)
- Decoders will automatically shut off if communication is lost
- Wire fault detection automatically shuts down any valve
- Valves can be operated up to 100' radius of the decoder

ELECTRICAL SPECIFICATIONS

- Input power: 105-130V ac, 50/60 Hz, 0.5 amp maximum, 1 amp idle
- Output power: 24V ac, 1.5 amps maximum total output or (36 VA) 1.0 amp per station or master valve
- UL, CUL, and FCC approved

SPECIFYING INFORMATION

TW-EG36	Rain Master Eagle, up to 36 decoders, rolled steel wall mount
TW-EG36-SB	Rain Master Eagle, up to 36 decoders, stainles steel wall mount
TW-EG36-SPED	Rain Master Eagle, up to 36 decoders, 14 gauge stainless steel security pedestal

Controller Description

DIMENSIONS

Model

TW model: H: 10" W: 13" D: 4.5"
TW & SB model: H: 17.5" W: 13" D: 4.5"
TW-SPED model: H: 34" W: 16" D: 16"

OPTIONAL 2-WIRE DECODERS AND ACCESSORIES

Model	Description
• TW-D-1	Single valve AC decoder
• TW-D-2	Dual valve AC decoder
• TW-D-4	Quad valve AC decoder
• TW-LA-1	Lightning arrestor used every 600 feet
• TW-SPLICE	14-gauge water-tight connectors
• TW-CAB-14	14-gauge (red/black) Polycoated (blue) wire

SENSORS & REMOTES

For over a decade, Irritrol has led the industry with its wireless sensor and remote technology. Irritrol sensors and remotes are designed to save time on installation, save water through automatic controller adjustments and ultimately save money.

AT-A-GLANCE	RS500 pgs 30-31	RS1000 pgs 30-31	RFS1000 pgs 30-31	CLIMATE LOGIC® pgs 32-34
TRANSMISSION RANGE (LINE-OF-SIGHT)		Up to 500'	Up to 500'	1000'
RAINFALL ADJUSTMENT (1/8"- 3/4")	•	•	•	•
25' CONTROL WIRE	•	Wireless	Wireless	Wireless
AUTOMATIC RESETTING BYPASS		•	•	
POWER FAILURE PROTECTION		•	•	•
DIGITAL FREEZE SENSOR			•	•
REPLACEABLE BATTERY		•	•	•
SIGNAL STRENGTH INDICATOR		•	•	•
WATER BUDGETING				•
2-YEAR'S WATER BUDGET HISTORY				•
VERSATILE MOUNTING OPTIONS	•	•	•	•
SOLAR SENSOR				•
ADJUSTABLE DRY-OUT RATE FOR RESET DELAY	•	•	•	•
WEATHER-FOLLOWING BY SITE LOCATION				•
WORKS WITH ALL 24 V CONTROLLERS	•	•	•	
COMMUNICATES WITH MULTIPLE RECEIVERS		•	•	•
OPTIONAL REMOTE CONTROL				•
WARRANTY	5 years	3 years	3 years	5 years

AT-A-GLANCE	CRR pgs 38-39	PRO-MAX™ pgs 40-41
TRANSMISSION RANGE (LINE-OF-SIGHT)	Up to 1000'	Up to 1.5 Miles
COMBINATION RECEIVER/ TRANSMITTER/CONNECTOR	•	
# OF PROGRAMMABLE ADDRESSES/PINS	Up to 9999	Up to 999
MAXIMUM STATIONS TO CONTROL	48	48
QUICK CONNECT SYSTEM	•	•
INDEPENDENT CONTROL OF MASTER VALVE OR PUMP		•
SETTABLE STATION LIMIT ON TRANSMITTER	•	•
TURN TRANSMITTER ON OR OFF	•	•
TURN STATION ON OR OFF	•	•
MANUAL STATION ADVANCE	•	•
PAUSE OR UN-PAUSE CURRENT STATION	•	•
2-MINUTE TEST RUN	•	
TURN ON SPECIFIC PROGRAM	•	
COMPATIBLE WITH ALL 24V CONTROLLERS		•
PM-UADAPT, UNIVERSAL CABLES INCLUDED		•
CONNECTOR HARMESSES AVAILABLE FOR PERMANENT MOUNT		•
INDIVIDUAL RECEIVERS AVAILABLE FOR PERMANENT MOUNT	•	
CARRYING CASE INCLUDED		•
BATTERY REQUIREMENT FOR TRANSMITTER	1 each, 9-volt	1 each, CR-P2 pack
WARRANTY	5 years	3 years







WIRED AND WIRELESS SENSORS

Taking water management to the next level, the proven Irritrol® RainSensor™ Series makes watering in the rain a mistake of the past. The reliable wireless and wired rain sensors conserve water by preventing irrigation during or after sufficient rainfall, while the wireless rain/freeze sensor also helps reduce vegetation damage and icing conditions when the temperature drops below a predetermined set point. With its compact design and host of convenient features, the RainSensor Series is the perfect complement to any standard controller.

KEY FEATURES & BENEFITS

WIRELESS MODELS

Require less labor for the installer

CONSTANT COMMUNICATION BETWEEN TRANSMITTER AND RECEIVER

Assures that even after a controller power outage, the controller is continually updated with the sensor's "wet" or "dry" status

VERSATILE MOUNTING OPTIONS

Requires no special tools — Quick-Clip™ gutter bracket and ½" conduit adapter included

SIGNAL STRENGTH INDICATOR

30

Ensures correct installation, communication link and signal integrity (wireless models)

SMART BYPASS™ FOR EASY SYSTEM OVERRIDE

Allows for temporary deactivation while automatically resetting on next activation (wireless models)

FULLY ADJUSTABLE SHUTOFF POINTS

From $\frac{1}{8}$ " to $\frac{3}{4}$ " of accumulated rainfall

DRY-OUT RATE ADJUSTMENT FOR RESET DELAY

Allows for setting the ideal dryout time

PATENTED WIRELESS TECHNOLOGY

Unsurpassed by the competition

visit us at: www.irritrol.com



PATENTED WIRELESS TECHNOLOGY



VERSATILE MOUNTING OPTIONS: (ALL IN ONE SKU)





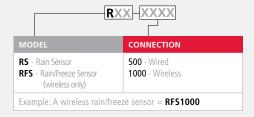


Gutter mount

Surface mount

Pole mount

SPECIFYING INFORMATION



ADDED FEATURES

RS1000/RFS1000

- Compatible with nearly all controllers
- Visual sensor status and alert indicators verify consistent operation
- Slide/snap-on cover provides additional protection to weather-proof receiver from the elements
- Power failure memory protection
- Three-year warranty

RFS1000

- Rain and freeze sensors fully integrated into one unit
- Highly accurate 41°F digital activation point

RS500

- Compatible with virtually all controllers
- 25-foot cable (UV-resistant, white jacket included) provides installation flexibility
- Easy, tool-free conversion to normally open operation
- Five-year warranty

OPERATING SPECIFICATIONS

- Sensor type: industry-standard hygroscopic discs
- Rain sensitivity; adjustable nominal 1/8" to 3/4"
- Operating temperature: -20°F to 120°F
- Housing material: UV-resistant engineered polymer
- Wireless only features:
 - Transmission range: up to 500' line-of-sight
 - Battery: Two CR2032 3V cells, 5-year life (typical)
 - Frequency: 418MHz

ELECTRICAL SPECIFICATIONS

- Receiver power: 22-28 V ac/V dc, 100mA (to be used with Class 2, UL-approved (transformer)
- Load rating: normally open or normally closed 3A @ 24 V ac
- UL Listed, FCC, CE, IC

MODELS

Model	Description
RS1000	Wireless RainSensor™
RFS1000	Wireless rain/freeze sensor
RS500	Wired RainSensor™

DIMENSIONS

• Transmitter: H: 1 ¹/₂", W: 1 ³/₄", D: 3 ³/₄"

• **Receiver:** H: 1 ¹/₂", W: 1", D: 3"

- RS1000-RX rain receiver for multiple controllers
- RFS1000-RX rain/freeze receiver for multiple controllers
- RSCAP cap/disc/spindle assembly
- RSBATT-TX battery pack (includes 2 batteries)







WIRELESS WEATHER SENSING SYSTEM

For simple, water-saving, weather-following, automatic irrigation control, Irritrol® introduces the Climate Logic® Weather Sensing System. Consisting of three components—a wireless transmitting weather sensor for installation outdoors, a receiver module to attach to the Irritrol controller, and an SD card with the 10-year, local historical weather information—the system monitors weather data, transmits it to the module, then alters the controller's program to "follow the weather". As for compatibility, the Climate Logic Weather Sensing System works with the Rain Dial® R, Total Control®-R, KwikDial® and the new MC-E controllers (blue model).

KEY FEATURES & BENEFITS

BUILT-IN RADIOS

For easy, wireless installation with less labor than wired systems

TEMPERATURE SENSOR FOR MONITORING AIR TEMPERATURE

Shuts system off in cold weather

$\textbf{RAINSENSOR}^{\text{TM}}$

Adjustable for amount of precipitation to shut off system

SOLAR SENSOR

Monitors the amount of the landscape site's sun exposure

RECEIVER MODULE

- Connects to the controller with a single plug-in cord. No bundle of wires to individually attach
- Converts historical and today's data from the weather sensor to percent of the hottest month's watering time to apply
- Appropriately alters the controller's water budget

WEATHER SD CARD

Contains the 10-year, historical weather information for North America with location access by zip code or latitude/longitude



COMPATIBLE WITH IRRITROL® RAIN DIAL®-R, IRRITROL TOTAL CONTROL®-R, KWIKDIAL® AND MC-E "BLUE" CONTROLLERS AND MORE



CLIMATE LOGIC® KIT







SD card with historical weather database

SPECIFYING INFORMATION

CL – [2	WIRELESS
MODEL	CONNECTION
CL -Climate Logic	100 - Receiver and transmitter kit
Example: a wireless system with se	ensor & module = CL-100-Wireless

* One CL-W1 weather sensor/transmitter can communicate with several CL-M1 receiver modules and their controllers.

OPERATING SPECIFICATIONS

- 1,000' line-of-sight signal range
- Compatible with the following Irritrol controllers:
 - Rain Dial-R Series and earlier Rain Dial (Blue)
 - Total Control-R Series
 - KwikDial Series (with adapter cable CMR-ADP)
 - New MC-E Controllers ("blue" model) with CMR-ADP adapter
- One weather sensor can communicate with multiple receiver modules

MODELS

<u>Model</u>	Description
CL-100-Wireless	Wireless weather sensor and module
CL-W1	Wireless weather sensor
CL-M1	Wireless receiver module
CL-R1	Remote control (transmitter only)
CL-MR	Mini-receiver (receiver only)
R-100-KIT	Mini remote kit (transmitter & receiver)

OPTIONAL ACCESSORIES

• Cable adapter CMR-ADP

R-100-KIT: REMOTE CONTROL INCLUDES



With the optional CLIMATE LOGIC® wireless, weather sensing system, the following controllers meet or exceed the performance criteria for the EPA Watersense® label:

- Rain Dial®-R
- Total Control®-R
- KwikDial®
- MC-E "Blue"



CLIMATE LOGIC®

WEATHER-BASED CONTROL SYSTEM



SD CARD WITH LOCAL WEATHER HISTORY





For the local, 10-year average historical weather information, insert the LOCATION card into the CLIMATE LOGIC module.

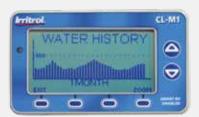
ACCURATE, PIN POINT LOCATION





Instead of guessing at your regional climate type or picking one out from a manual, pin down the site's location by US zip code or by latitude/longitude. Press "SAVE" to upload the area's historical weather information from the SD card.

KEY FEATURES FOR CLIMATE LOGIC®



CLIMATE LOGIC builds a bar chart showing each day's automatic water budget setting with displayable history of up to two years.



Sensors come pre-matched with their receiver modules. However, for large projects, several modules can be set to listen to one sensor.



On most of the compatible controllers, the installer can select the programs that will "follow the weather" (A only, A&B or A&B&C).



Cold temperature system shutoff and "dry out" period after a rain event are selectable.



The time for the automatic, daily adjustment to the weather is user selectable.

LISTED BY THE IRRIGATION ASSOCIATION AS A CLIMATOLOGICALLY-BASED, SMART CONTROL SYSTEM WHEN COMBINED WITH ANY COMPATIBLE IRRITROL® CONTROLLER







With a lockable, vandal- and weather-resistant case, the Irritrol[®] SR-1 can be mounted indoors or outdoors to provide reliable switching control for pumps or other electrical devices from the controller.

KEY FEATURES & BENEFITS

ELECTRICAL RELAYS FOR BOTH LOW VOLTAGE (24V AC) CONTROL SWITCHING AND HIGH VOLTAGE (120V AC OR 240V AC) MAIN POWER CONTACTS

- Allows remote pump switching using 24V ac output from an irrigation controller's master valve/pump start circuit
- Opens and closes main power contacts for pumps (1HP at 120V ac 1 Phase or 2HP at 250V ac 1 Phase)
- Note: 2HP at 120V ac will exceed maximum amp rating.

HIGHLY EFFICIENT 0.1 AMP OPERATING REQUIREMENT

Draws less holding power than most solenoid valves

CAN ALSO BE USED WITH THE IRRITROL PC CONTROL SYSTEM FOR SWITCHING CONTROL OF LOW VOLTAGE LANDSCAPE LIGHTING

Saves the expense of an extra timer and puts irrigation and landscape lighting control in one location on the owner's computer

ADDED FEATURES

- Enclosed, weather-resistant case
 Allows the flexibility of indoor or outdoor mounting
- Five-year warranty

ELECTRICAL RATINGS

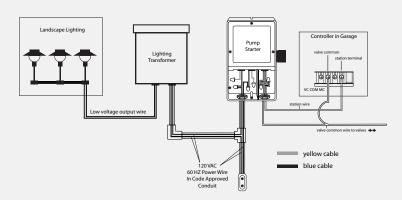
- Contacts: Up to 1 HP at 120V ac, 1 Phase Up to 2 HP at 250V ac, 1 Phase (20A at 250V ac)
- Coil: 24V ac, 3VA (19V ac Min, 30V ac Max)
- Coil Draw: 0.1Amp

DIMENSIONS

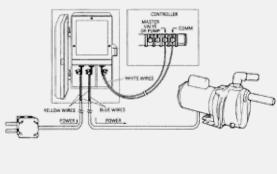
• H: 9 ¹/₂", W: 6 ¹/₄", D: 3 ³/₄"

WIRING DIAGRAMS

SR-1 AS A LANDSCAPE LIGHTING RELAY



SR-1 AS A PUMP START RELAY







Flow Sensors can be used in conjunction with any Sentar IITM or Rain Master EagleTM controllers to automatically detect line breaks as well as measure flow limits at point of connection (POC) and individual stations. Should a break or leak occur, the controller will shut down the master valve to prevent significant landscape damage.

KEY FEATURES & BENEFITS

BRASS FLOW SENSOR ADAPTER

Sizes 1" thru 2.5". Flow ranges from 2 GPM to 160 GPM, NFPT connections, rated up to 400 psi

PLASTIC FLOW SENSOR ADAPTER

36

Sizes 1.5" thru 4". Flow ranges from 5 GPM to 500 GPM, Schedule 80 PVC "slip" glue connections, rated up to 100 psi

IMPELLER FLOW SENSOR ADAPTER

For all pipe materials and sizes up to 40" in diameter. Mounts in a 2" NPT threaded outlet (NFPT) or pipe saddle (not included). Must be field-calibrated onsite. Flow may be set from 2 GPM to 500 GPM. Call factory for specific settings. 400 psi maximum operating pressure



FLOW SENSORS SELECTION CHART

FLOW SENSOR MODEL	PIPE CONNECTION SIZE	SUGGESTED OPERATING RANGE	MAXIMUM WATER PRESSURE	K VALUE	OFFSET VALUE	BODY MATERIAL	CONNECTION TYPE
FS-B100	1"	2-40 GPM	400 psi	109	27	Brass	NPT female
FS-B125	1 1/4"	3-60 GPM	400 psi	209	32	Brass	NPT female
FS-B150	1 ½"	4-80 GPM	400 psi	291	24	Brass	NPT female
FS-B200	2"	10-100 GPM	200 psi	750	0	Brass	NTP female with copper male adapter
FS-B250	2 ½"	16-160 GPM	200 psi	1021	370	Brass	NTP female
FS-150	1 ½"	5-100 GPM	100 psi @ 68F	457	0	PVC	Slip
FS-200	2"	10-200 GPM	100 psi @ 68F	776	104	PVC	Slip
FS-300	3"	20-300 GPM	100 psi @ 68F	2268	483	PVC	Slip
FS-400	4"	40-500 GPM	100 psi @ 68F	3752	834	PVC	Slip
FS-INSERT-B	3 to 40 inches	Varies, call factory	400 psi	Varies, co	call factory Requires pipe saddle w		

WHY USE A FLOW SENSOR?



call toll free: 800-634-TURF (8873)







Irritrol® introduces the Contractor Residential Remote (CRR) with programmable handheld transmitter. The remote provides the installer, or maintenance personnel, the convenience and cost savings of one-person remote access. Use for system checks, troubleshooting, and supplemental watering as needed. An easily accessible mini-USB port on the handheld transmitter allows a computer connection for future upgrades or new product applications so there is no need to purchase a new remote as new features or controllers are added.

KEY FEATURES & BENEFITS

LABOR SAVINGS

Makes system testing and maintenance a one person job

COST SAVINGS

Programmable upgrades to the handheld without buying a new remote

EXTRA SALES OPPORTUNITY

Remote kit for contractors to offer to the end user

"9999" SELECTABLE PIN CODES

Individual PIN addresses reduce "cross talk" and unauthorized activity

COMPATABLE WITH FOUR SERIES OF IRRITROL CONTROLLERS

The mini-receiver connects to the standard remote ports on 35 models

PROGRAMMABLE FOR FUTURE UPGRADES OVER THE INTERNET

Computer connectable handheld allows downloadable features/updates

WORKS WITH THE IRRITROL CLIMATE LOGIC® WEATHER SENSING SYSTEM

Allows remote access through CLIMATE LOGIC

RANGE UP TO 1,000' (LINE-OF-SIGHT)

Adequate for large residential and small to medium commercial irrigation systems







FUTURE UPGRADES ONLINE



When Irritrol comes up with new features or a future remote function, you can receive it via email and download the application.

OPERATING SPECIFICATIONS

- Up to 1,000' range LOS (line-of-sight)
- 9-volt battery powers the handheld
- Controller powers the remote receiver
- Address code "0000 through 9999
- Provides individual station (zone) ON and OFF command
- Set maximum station count to match controller
- "Start Program A, B, or C" capability on some controllers

COMPATIBLE WITH CONTROLLERS:

• Irritrol brand

- Kwik Dial®
- Rain Dial®-R
- Total Control®-R
- MC-E Blue

• Toro brand

- Custom Command®
- TMC-212
- TMC-424-E

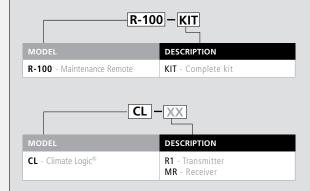
MODELS

Model	<u>Description</u>
R-100-KIT	Transmitter, receiver and cable adapter
CL-R1	Remote transmitter only
CL-MR	Receiver only
CMR-ADP	Cable adapter only

DIMENSIONS

• Transmitter: H: 7", W: 2¾", D:1¼" • Receiver: H: 5½", W: 2¾ ", D: 1"

SPECIFYING INFORMATION



call toll free: 800-634-TURF (8873)





REMOTE CONTROL

The Pro Max Remote Control System eliminates lost time and energy roaming between the field and the controller. It makes light work of system inspections and service work, providing field personnel with complete control over any compatible irrigation controller. At nearly a mile away, the operator can activate a single or multiple stations with the push of a button, permitting immediate observation of system operation and performance. The controller access code feature permits independent control of up to 999 controllers with permanent mount receivers.

KEY FEATURES & BENEFITS

COMPLETE REMOTE CONTROL KIT IN A CARRYING CASE

Includes transmitter, receiver, connector & cable assembly and a user's guide in one convenient, portable case

OPERATES WITH SEVERAL SERIES OF IRRITROL & OTHER MANUFACTURERS' 24V AC CONTROLLERS (PROMAX-UA VERSION ONLY)

Allows maintenance control for a wide variety of controllers

UP TO 1 MILE RANGE (LINE-OF-SIGHT)

Provides operating range for larger projects

ADDRESSES UP TO 999 INDIVIDUAL CONTROLLERS

Allows transmission of commands to specific controllers even though others are within range in permanent mount applications

REMOTELY CONTROLS UP TO 200 STATIONS

Permanent mount or portable models available

QUICK CONNECTION/DISCONNECTION SYSTEM

Allows receiver to be easily moved from one controller to another





- Independent control of master valve and/or pump
- Single or multi-station on capability for testing system hydraulics
- Timed station operation selectable from 1 to 60 minutes
- Turn a program on or off (when used with Sentar II or Rain Master Eagle controllers)
- Small, compact receiver for permanent internal mount
- Detects (provides an audible alert) and protects against field wiring short circuits
- Receiver has built-in safety default to automatically turn station off after 60 minutes
- Audible transmitter and receiver tones verify proper Pro Max operation at all times
- Audible alarm warns of low power condition
- No fuses required
- Limited two-year warranty
- Utilizes three mechanisms to ensure reliable, interference-free communications:
 - **A.** Digital filters
 - **B.** Factory set remote access codes
 - C. Frequency Modulation



- Transmitter
- Receiver
- Connector cables for any 24V controller up to 32 stations*
- Carrying case
- Antennas
- * Not included in standard Pro Max

OPERATING SPECIFICATIONS

PRO MAX Receiver

- Operating frequency:154.600 MHz
- Sensitivity: 0.4 microvolt typical
- Operating temperature range: 32 to 140 degrees F°
- Storage temperature range: -4 to 158 degrees F°
- Humidity range: 0 to 90% non-condensing

PRO MAX Transmitter

- Operating frequency: 154.600 MHz
- Modulation type: frequency modulation
- Frequency stability: 005%
- Operating temperature range: 32 to 148 degrees F°
- Storage temperature range: -4 to 158 degrees F°
- Humidity range: 0 to 90% non-condensing

ELECTRICAL SPECIFICATIONS

PRO MAX Receiver

• Power source: 22-32 V ac 50/60 Hz

PRO MAX Transmitter

- Battery: CR-P2 lithium 6V (user replaceable)
- Battery life expectancy: 1 season (typical)

MODELS

Model	Description
PROMAX	Complete remote kit for Sentar II & Rain Master Eagle controllers
PROMAX-UA	Complete remote kit for any manufacturer's 24V AC controller

DIMENSIONS

- PRO MAX Receiver
 - L: 6 ¼", W: 3 ¼", H: 1 ¹/16" (less antenna)
- PRO MAX Transmitter

L: 3", W: 1 ³/₈", H: 5 ½" (less antenna)

OPTIONAL ACCESSORIES AND ADD-ONS

Model	Description
PMR-KIT	Permanent mount receiver (preset with user- defined controller access code)
PM-XMTR	Hand-held transmitter
PM-RCVR	Stand alone receiver
PM-UADAPT	Universal adaptor and cables

Installing valves is hard work. But luckily, Irritrol® valves are reliable and easy to maintain. Our valves have been the industry standard for more than 40 years. We were the first to bring PVC, jar-top, and glass-filled nylon valves to irrigation. And we continue to lead the way with dependable products that make you more productive.

AT-A-GLANCE residential valves		2400/2600	205	2500	2700	311A	2623/300
		SERIES pgs 44-45	SERIES	SERIES	SERIES	SERIES	SERIES
ODERATION	MANUAL	pgs 44-45	pgs 46-47	pgs 48-49	pgs 50-51	pgs 52-53	pgs 54-55
OPERATION	ELECTRIC	•	•	•	•	•	•
CITE	3/4"			•	•	•	•
SIZE	1"	•	•	•	•	•	•
	ANGLE	2600 only					
CONFIGURATION	GLOBE	2400 only	•	•			
	H-BODY				•	•	
INLET/OUTLET	THREADED	•	•	•	•	•	
	SLIP	2400 only	•	•			
	MALE X MALE	2400 only					
	MALE X BARB	2400 only					
MANUAL FLOW	STANDARD				•	•	•
CONTROL	OPTIONAL	•	•	•			
CONSTRUCTION	PVC	•	•	•	•	•	2623 only
CONSTRUCTION	GLASS-FILLED NYLON					•	300 only
A	NTI-SIPHON				•	•	
	RE REGULATING OMNIREG®)					•	•
	ERNAL BLEED	•		•	•	•	•
EXTERNA	AL BLEED (FLUSH)	•	•	•	•	•	•
W	/ARRANTY	5 years	5 years	5 years	5 years	5 years	5 years

	-A-GLANCE Mercial valves	200B SERIES pgs 56-57	700 SERIES pgs 58-59	100 SERIES pgs 60-61	100-S SERIES pgs 62-63
ODEDATION	MANUAL				
OPERATION	ELECTRIC	•	•	•	•
	3/4"		•		
	1"	•	•	•	
SIZE	1 1/2"	•	•	•	
	2"	•	•	•	•
	3"			•	•
	ANGLE	•		•	•
CONFIGURATION	GLOBE	•	•	•	•
	H-BODY				
INLET/OUTLET	THREADED	•	•	•	•
MANUAL FLOW	STANDARD	•	except 3/4"	•	•
CONTROL	OPTIONAL				
CONCERNCEION	PVC	•			
CONSTRUCTION	GLASS-FILLED NYLON		•	•	•
	URE REGULATING (OMNIREG®)	•	•	•	•
IN1	TERNAL BLEED	•	•	•	•
EXTERN	IAL BLEED (FLUSH)	•		•	•
ANTI-	CONTAMINATION			102 only	
CONTINUOU	S SCRUBBING FEATURE				•
	WARRANTY	5 years	5 years	5 years	5 years







1" PLASTIC MODELS

The Irritrol[®] 2400 Series globe and 2600 Series angle valves are popular with users because of the convenience of their threaded bonnets, the reliability of their double-beaded diaphragm and the durability of their heavy-duty, corrosion and UV-resistant PVC construction. Fast and easy to install and service, these 1-inch residential plastic valves offer an encapsulated solenoid, internal/external bleed, an optional flow control feature, and are available in multiple configurations.

KEY FEATURES & BENEFITS

THREADED BONNET DESIGN

Allows easy servicing without removal from the system

RUGGED, DOUBLE-BEADED SANTOPRENE® DIAPHRAGM Ensures a leak-proof seal

INTERNAL AND EXTERNAL BLEED (FLUSH MODE)

Allows for manual operation

FULL STAINLESS-STEEL METERING SYSTEM

Allows for consistent valve operation

HEAVY-DUTY, CORROSION AND UV-RESISTANT PVC, GLASS-FILLED POLYPROPYLENE AND STAINLESS STEEL CONSTRUCTION

Durable, long-term performance

AVAILABLE IN MULTIPLE CONFIGURATIONS—FEMALE NPT, SLIP, MALE X MALE AND MALE X BARB

Will handle all regional installation variances (2600 available with NPT threads only)







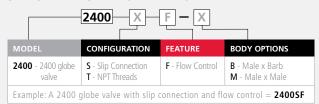
FRICTION LOSS DATA

Flow Rate - GPM

MODEL	SIZE	.25	2	5	10	15	20	30
2400 Series	1″	5.00	4.60	3.50	4.00	2.97	3.26	6.20
2600 Series	1″	5.00	4.60	3.34	2.15	1.78	1.90	3.85

- 1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
- 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION



2600 T F								
MODEL	CONFIGURATION	FEATURE						
2600 - 2600 angle valve	T - NPT Threads	F - Flow Control						
Example: A 2600 angle valve	with NPT threads and fl	ow control = 2600TF						

ADDED FEATURES

- Buna-N valve seat seal
- Floating bleed tube allows thermal expansion without affecting performance
- Encapsulated injection-molded solenoid with a captive hex plunger
- Five-year warranty

OPERATING SPECIFICATIONS

Flow range: .25-30 GPMPressure range: 10-150 psi

ELECTRICAL SPECIFICATIONS

- Solenoid: 24 V ac
- Inrush volt-amp: 24 V ac-9.6 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 V ac-4.8 VA
- Holding current: .2 amp

MODELS

Model	<u>Description</u>
2400S	1" globe slip connection valve
2400SF	1" globe slip connection with flow control
2400T	1" globe NPT threaded connection
2400TF	1" globe NPT threaded connection with flow control
2400T-B	1" globe male x barb connection
2400TF-B	1" globe male x barb connection with flow control
2400T-M	1" globe male x male connection
2400TF-M	1" globe male x male connection with flow control
2600T	1" angle NPT threaded connection
2600TF	1" angle NPT threaded connection with flow control

DIMENSIONS

- **2400:** H: 5 1/8", W: 3", L: 4"
- **2600:** H: 6 ½", W: 3", L: 3 ¾"

- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL)
 Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Threaded bonnet wrench (2400-45)







^{*} Optional accessories are field-installable. Must specify separately if required.







1" PLASTIC MODELS

The Irritrol[®] 205 Series 1-inch plastic valve is the irrigation industry's time-tested leader for dependable operation in potable and dirty water applications. With a proven track record of success in a wide range of environments, these debris-tolerant valves are available with flow control as an optional feature. Constructed of heavy-duty, corrosion- and UV-resistant PVC, the 205 Series features a high-flow, low-friction-loss-design that has a pressure range of 10-150 psi and flow range of .25-30 GPM. A manual bleed and a rugged, nylon-reinforced Buna-N diaphragm add to this valve's wide popularity.

KEY FEATURES & BENEFITS

HEAVY-DUTY, CORROSION- AND UV-RESISTANT PVC CONSTRUCTIONProven durability

HIGH-FLOW, LOW FRICTION LOSS DESIGNMore efficient system design and low-flow capability

RUGGED, NYLON-REINFORCED BUNA-N DIAPHRAGM Ensures a leak-proof seal

AVAILABLE IN FEMALE NPT OR SLIP CONFIGURATIONS (NO MALE PIPE ADAPTER REQUIRED)

Will handle all regional installation variances

OPTIONAL FLOW CONTROL

Allows precise adjustment and manual shutoff



OVER 40 YEARS OF DEPENDABILITY



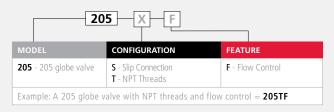
A flat fiber washer diaphragm allows the 205 to work in a wide flow range as well as easily handle debris

FRICTION LOSS DATA

						Flov	v Rate	- GPM
MODEL	SIZE	.25	2	5	10	15	20	30
205 Series	1"	5.40	3.82	3.00	2.20	1.90	3.10	5.10

- 1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
- 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION



ADDED FEATURES

- Buna-N valve seat seal
- Manual external bleed
- Debris-tolerant design
- Encapsulated injection-molded solenoid with a captive hex plunger
- Removable, tamper-resistant flow control handle
- Easily serviced without removal from the system
- Five-year warranty

OPERATING SPECIFICATIONS

Flow range: 0.25-30 GPMPressure range: 10-150 psi

ELECTRICAL SPECIFICATIONS

- Solenoid: 24 V ac
- Inrush volt-amp: 24 V ac-9.6 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 V ac-4.8 VA
- Holding current: .2 amp

MODELS

Model	<u>Description</u>
205S	1" slip connection
205SF	1" slip connection with flow control
205T	1" NPT threaded connection
205TF	1" NPT threaded connection with flow con

2051F I NPT threaded connection with flow contri

DIMENSIONS

• H: 5 ¹/8", W: 2 ³/₄", L: 5"

- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL)
 Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.

^{*} Optional accessories are field-installable. Must specify separately if required.







3/4" AND 1" PLASTIC MODELS

The Irritrol® 2500 Series is a classic example of making a great valve even better. Irritrol has taken its proven 205 Series of valves to the next level by adding a full menu of features including a patented "floating metering system" for consistent performance in dirty water applications and a rugged, double-beaded diaphragm for long-term performance with no leakage. The 2500's manual internal bleed enables the valve to be opened without filling the valve box with water. And servicing is made easy and efficient with captured screws.

KEY FEATURES & BENEFITS

PATENTED "FLOATING METERING SYSTEM"

Allows this valve to easily handle dirty water

HIGH-FLOW, LOW FRICTION LOSS DESIGN COMBINED WITH LOW-FLOW CAPABILITY

Can handle a wide range of applications

RUGGED, DOUBLE-BEADED SANTOPRENE® DIAPHRAGM

Ensures a leak-proof seal

INTERNAL AND EXTERNAL BLEED (FLUSH MODE)

Allows for manual operation

FULL STAINLESS-STEEL METERING SYSTEM

Allows for consistent valve operation

HEAVY-DUTY, CORROSION AND UV-RESISTANT PVC AND STAINLESS STEEL CONSTRUCTION

Proven durability

AVAILABLE IN FEMALE NPT OR SLIP CONFIGURATIONS (NO MALE PIPE ADAPTER REQUIRED)

Will handle all regional installation variances

SELF-ALIGNING BONNET

Permits fast and easy servicing without removal from the system







Debris-tolerant, patented "floating metering system" makes this valve ideal for wells and dirty water applications

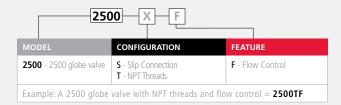
FRICTION LOSS DATA

Flow Rate - GPM

MODEL	SIZE	.25	2	5	10	15	20	30
2500 Series	1″	5.40	3.82	3.00	2.20	1.90	3.10	5.10
2507 Series	3/4"	2.75	3.40	3.85	4.00	2.40	3.98	6.19

- 1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
- 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION



250	7 F			
MODEL	CONFIGURATION	FEATURE		
2507 - 2507 globe valve	T - NPT Threads	F - Flow Control		
Example: A ¾" 2507 glo	be valve with NPT threads and f	low control = 2507TF		

ADDED FEATURES

- Buna-N valve seat seal
- Debris-tolerant design
- Optional flow control allows precise adjustment and manual shutoff
- Encapsulated injection-molded solenoid with a captive hex plunger
- Removable, tamper-resistant flow control handle
- Easily serviced without removal from the system
- Five-year warranty

OPERATING SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

• Flow range: 0.25-30 GPM

• Pressure range: 10-150 psi

• Solenoid: 24 V ac

• Inrush volt-amp: 24 V ac-9.6 VA

• Inrush current: .4 amp

• Holding volt-amp: 24 V ac-4.8 VA

• Holding current: .2 amp

MODELS

<u>Model</u>	<u>Description</u>
2500S	1" slip connection
2500SF	1" slip connection with flow control
2500T	1" NPT threaded connection
2500TF	1" NPT threaded connection with flow control
2507TF	3/4" NPT threaded connection with flow control

DIMENSIONS

• **2500**: H: 5 ¹/8", W: 2 ³/4", L: 5" • **2507**: H: 5 ¹/8", W: 2 ³/4", L: 5"

- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL)
 Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- * Optional accessories are field-installable. Must specify separately if required.







34 AND 1" PLASTIC MODELS

The Irritrol[®] anti-siphon 2700 Series valves offer optimum performance, reliability and ease-of-use for a wide variety of residential applications. Featuring anti-siphon capability, this family of plastic valves also features flow control for precise flow adjustment, manual shutoff and a built-in atmospheric vacuum breaker to eliminate back siphonage. Available in electric and manual models, these valves also feature a flow range from .25 to 30 GPM and a pressure range from 10 to 150 psi.

KEY FEATURES & BENEFITS

RUGGED, DOUBLE-BEADED SANTOPRENE® DIAPHRAGMEnsures a leak-proof seal

INTERNAL AND EXTERNAL BLEED (FLUSH MODE) Allows for manual operation

FULL STAINLESS-STEEL METERING SYSTEM (DPR MODELS)Consistent valve operation

PATENTED "FLOATING METERING SYSTEM" (APR MODELS)
Consistent valve operation

HEAVY-DUTY, CORROSION- AND UV-RESISTANT PVC, GLASS-FILLED POLYPROPYLENE (DPR MODELS ONLY) AND STAINLESS STEEL CONSTRUCTION

Durable, long-term performance

50

SELF-ALIGNING BONNET WITH CAPTURED HEX/PHILLIPS SCREWS

Permits fast and easy servicing without removal from the system (APR models)

THREADED BONNET DESIGN

Allows easy servicing without removal from the system (DPR models)

PATENTED, TAMPER-RESISTANT FLOW-CONTROL MECHANISM

Allows for precise water flow (DPR models)

visit us at: www.irritrol.com







FRICTION LOSS DATA

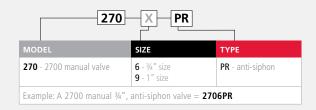
			Flow Rate - GPI							
MODEL	SIZE	5	10	15	20	25				
2706PR	3/4"	1	3	5						
2709PR	1"	1	1	2	4	6				

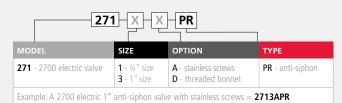
Flow Rate - GPM

MODEL	SIZE	.25	2	5	10	15	20	30
2711APR & DPR	3/4"	5.0	5.8	4.14	4.11	4.72	7.60	
2713APR & DPR	1″	5.0	5.5	2.03	3.10	2.22	3.72	8.01

1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA. 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION





Note: Anti-siphon valve to be mounted above ground at least 6" above highest sprinkler head (consult local codes).

ADDED FEATURES

- Buna-N valve seat seal
- Flow control for precise adjustment and manual shutoff
- Gravity-type anti-siphon poppet
- Encapsulated injection-molded solenoid with a captive hex plunger
- Removable, ergonomic, tamper-resistant flow-control handle (APR models)
- Electric H-body with atmospheric vacuum breaker
- Five-year warranty

OPERATING SPECIFICATIONS

• Flow range: .25-30 GPM • Pressure range: 10-150 psi

ELECTRICAL SPECIFICATIONS

- Solenoid: 24 V ac
- Inrush volt-amp: 24 V ac-9.6 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 V ac-4.8 VA
- Holding current: .2 amp
- Meets listing standards of ASSE, IAPMO and CSA

MODELS

Model	Description
2711APR	3/4" electric, flow control, stainless screw bonnet
2713APR	1" electric, flow control, stainless screw bonnet
2711DPR	3/4" electric, flow control, threaded bonnet
2713DPR	1" electric, flow control, threaded bonnet
2706PR	¾" manual
2709PR	1" manual

DIMENSIONS

- **2706:** H: 4 ⁷/8", W: 2 ⁵/8", L: 5 ³/₄"
- **2709**: H: 5 ¹/₁₆", W: 3 ¹/₈", L: 6 ¹/₄"
- **2711:** H: 5 ⁵/8", W: 3", L: 6 ¼"
- **2713:** H: 6", W: 3", L: 6 ⁷/8"

OPTIONAL ACCESSORIES*

- Recycled-water solenoid kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (DCL) Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Threaded bonnet wrench (2400-45) for DPR models

* Optional accessories are field-installable. Must specify separately if required.









3/4" AND 1" PLASTIC MODELS

The Irritrol® 311 Series offers a comprehensive package of performance-enhancing features. Beginning with the reliability of a leak-proof, double-beaded, nylon-reinforced Buna-N diaphragm, the strength of glass-filled nylon and the expanded range of a maximum working pressure rating of 150 psi, the 311 Series' list of features easily outdistances the competition. Compatibility with the OmniReg® modular pressure regulator make them the industry's only anti-siphon valves with a pressure regulation option. Additional features include an upgraded bonnet design, a self-cleaning metering system for dirty water applications and a captive plunger solenoid. Plus, the actuator module is removable as a single unit with the diaphragm and internal components held in place, which means no more lost diaphragm screws and springs during installation.

KEY FEATURES & BENEFITS

UPPER BODY AND AIR-VENT CAP CONSTRUCTED OF **GLASS-FILLED NYLON**

Provides long-term performance

RUGGED, DOUBLE-BEADED NYLON-REINFORCED **BUNA-N DIAPHRAGM**

Ensures a leak-proof seal

INTERNAL AND EXTERNAL BLEED (FLUSH MODE)

Manual operation

ACCEPTS OMNIREG MODULAR PRESSURE REGULATOR

Ensures consistent performance

EXTERNALLY REMOVABLE SELF-CLEANING METERING SYSTEM

Ensures consistent performance in recycled-water applications







FRICTION LOSS DATA

						Flow	/ Rate	- GPM
MODEL	SIZE	1	5	10	15	20	25	30
311A75	3/4"	5.5	6.0	8.0	9.0	11.0		
311A-1	1″	5.5	6.0	7.5	8.5	10.0	13.0	18.5

1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA. 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION



Note: Anti-siphon valve to be mounted above ground at least 6" above highest sprinkler head (consult local codes).

ADDED FEATURES

- Flow control allows precise adjustment and manual shutoff
- Lower body constructed of heavy-duty, corrosion- and UV-resistant PVC
- Buna-N valve seat seal
- All stainless steel hardware and springs
- Unique three-way stainless steel bonnet screws with threaded-brass inserts
- Encapsulated injection-molded solenoid with a captive hex plunger
- Removable, tamper-resistant flow control handle
- Meets listing requirements of IAPMO-UPC and City of Los Angeles
- Five-year warranty

OPERATING SPECIFICATIONS

Flow range: 1-30 GPMPressure range: 10-150 psi

• Operating temperature: up to 130° F

ELECTRICAL SPECIFICATIONS

• Solenoid: 24 V ac

• Inrush volt-amp: 24 V ac-9.6 VA

• Inrush current: .4 amp

• Holding volt-amp: 24 V ac-4.8 VA

• Holding current: .2 amp

MODELS

Model	Description
311A75	3/4" flow control, internal bleed
311A-1	1" flow control, internal bleed

DIMENSIONS

• **311A-.75:** H: 8 ¹/₂", W: 3 ⁵/₈", L: 6"

• **311A-1:** H: 8 ¹/2", W: 3 ⁵/8", L: 6"

- OmniReg® 5-30 psi regulator (OMR-30)
- OmniReg 5-100 psi regulator (OMR-100)
- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL) Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Weatherproof gauge (SPK-100)
- * Optional accessories are field-installable. Must specify separately if required.







3/4" AND 1" PLASTIC MODELS

These electric anti-siphon valve adapters feature outstanding durability for consistent, dependable performance in all types of applications. Plus, having all of the internal components captured in a single unit means converting manual valves to electric doesn't get any easier.

KEY FEATURES & BENEFITS

2623DPR SERIES

CONVERTS CHAMPION® BRASS ANTI-SIPHON VALVES TO ELECTRIC OPERATION

Automatic system function

INTERNAL AND EXTERNAL BLEED (FLUSH MODE)

Allows for manual operation

RUGGED, DOUBLE-BEADED SANTOPRENE® DIAPHRAGM

Provides a leak-proof seal

HEAVY-DUTY, CORROSION- AND UV-RESISTANT PVC AND STAINLESS STEEL CONSTRUCTION

For long-term reliability

300 SERIES

CONVERTS ¾-INCH AND 1-INCH CHAMPION BRASS ANTI-SIPHON VALVES (MODELS 300-.75 AND 300-1) AND 1-INCH IRRITROL MANUAL VALVES TO ELECTRIC OPERATION

Automatic system function

INTERNAL AND EXTERNAL BLEED (FLUSH MODE)

Allows for manual operation

RUGGED, DOUBLE-BEADED NYLON-REINFORCED BUNA-N DIAPHRAGM

Provides a leak-proof seal

EXTERNALLY REMOVABLE SELF-CLEANING METERING SYSTEM

Ensures consistent performance in recycled-water applications

TOUGH, GLASS-REINFORCED NYLON, STAINLESS STEEL AND BRASS CONSTRUCTION

Provides proven durability



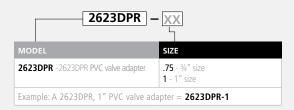
SINGLE PIECE ADAPTERS MAKE CONVERSIONS SIMPLE

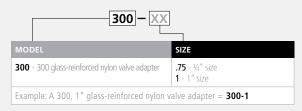
Internal and external bleed for manual operation





SPECIFYING INFORMATION





Note: Anti-siphon valve to be mounted above ground at least 6" above highest sprinkler head (consult local codes).

ADDED FEATURES

- Ergonomic flow control allows precise flow adjustment and manual shutoff
- Buna-N valve seat seal
- Encapsulated injection-molded solenoid with a captive hex plunger
- Accepts OmniReg[®] modular pressure regulator
- Five-year warranty

2623DPR Series Only

- Slow-closing design
- Full stainless steel metering system
- Hex/Phillips screws
- Easy installation
- Compact design

300 Series Only

• Unique three-way stainless steel bonnet screws with threaded-brass inserts

OPERATING SPECIFICATIONS

• Pressure range: 10-150 psi

ELECTRICAL SPECIFICATIONS

• Solenoid: 24 V ac

• Inrush volt-amp: 24 V ac-9.6 VA

• Inrush current: .4 amp

• Holding volt-amp: 24 V ac-4.8 VA

• Holding current: .2 amp

MODELS

Model	Description
2623DPR75	3/4" PVC valve adapter
2623DPR-1	1" PVC valve adapter
30075	¾" glass-reinforced nylon valve adapter
300-1	1" glass-reinforced nylon valve adapter

DIMENSIONS

2623DPR Series: H: 6 ³/₄", W: 2 ⁷/₈"
 300 Series: H: 7 ¹/₄", W: 4"

- OmniReg 5-30 psi regulator (OMR-30)
- OmniReg 5-100 psi regulator (OMR-100)
- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL) Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Weatherproof gauge (SPK-100)

^{*} Optional accessories are field-installable. Must specify separately if required.









1", 1½" AND 2" PLASTIC MODELS

The Irritrol[®] 200B Series globe/angle valves have built their popularity on a proven record of reliability and a reputation for offering valuable features at an affordable price. The 200B Series provides manual internal and external bleed, heavy-duty, UV-resistant PVC construction, stainless steel hardware, a double-beaded diaphragm and a captive solenoid plunger.

KEY FEATURES & BENEFITS

HEAVY-DUTY, CORROSION- AND UV-RESISTANT PVC
CONSTRUCTION WITH STAINLESS STEEL SPRING AND HARDWARE
Provides consistent operation

SLOW-CLOSING DESIGN

Reduces water hammer and resulting stress on the system

RUGGED, DOUBLE-BEADED SANTOPRENE® DIAPHRAGMEnsures a leak-proof seal

INTERNAL AND EXTERNAL BLEED (FLUSH MODE)

Allows for manual operation

ACCEPTS OMNIREG® MODULAR PRESSURE REGULATOR

Ensures consistent performance

HIGH-STRENGTH RIBBED BONNET AND BOTTOM INLET

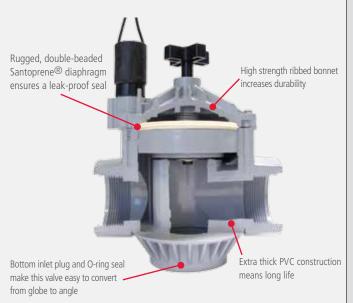
Increases durability

UNIQUE THREE-WAY STAINLESS STEEL BONNET

Screws accept Phillips, flat-blade and hex-driver tools for easy servicing without removal from the system



DURABLE HEAVY-DUTY CONSTRUCTION



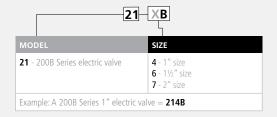
FRICTION LOSS DATA

Flow Rate - GPM

	MODEL	SIZE	GLOBE ANGLE	5	10	15	20	30	40	50	60	80	100	120
ĺ	214B	1"	G	3.36	2.60	1.82	2.35	5.40						
	2140	'	Α	3.09	2.20	1.48	1.98	4.00						
ı	216B	11/2"	G				3.04	2.66	2.33	2.97	4.14	5.62		
	2100	1 .12	Α				2.76	2.24	1.99	2.30	3.10	4.42		
ĺ	217B	2"	G				2.00	1.93	1.73	1.55	1.68	2.99	4.85	6.31
	Z1/B		Α				2.00	1.93	1.73	1.55	1.59	2.15	3.27	4.88

1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA. 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION



ADDED FEATURES

- Flow control allows precise adjustment and manual shutoff
- Buna-N valve seat seal
- Unique threaded inlet plug O-ring seal prevents leaks
- Encapsulated injection-molded solenoid with a captive hex plunger
- Five-year warranty

OPERATING SPECIFICATIONS

- Flow range: 5-120 GPM
- Pressure range: 20-150 psi

ELECTRICAL SPECIFICATIONS

- Solenoid: 24 V ac
- Inrush volt-amp: 24 V ac-9.6 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 V ac-4.8 VA
- Holding current: .2 amp

MODELS

Model	Description
214B	1" NPT threads, flow control
216B	1½" NPT threads, flow control
217B	2" NPT threads, flow control

DIMENSIONS

- **214B:** H: 6 ¹/2", W: 2 ¹/2", L: 4 ¹/2"
- **216B:** H: 7 ³/4", W: 4 ¹/4", L: 5 ¹/2"
- **217B:** H: 8 ³/₄", W: 5 ³/₈", L: 6 ¹/₄"

- OmniReg® 5-30 psi regulator (OMR-30)
- OmniReg 5-100 psi regulator (OMR-100)
- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL)
 Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Weatherproof gauge (SPK-100)
- * Optional accessories are field-installable. Must specify separately if required.







34", 1", 11/2" AND 2" PLASTIC MODELS

Featuring a straight-through flow path that dramatically reduces pressure loss, the Irritrol® UltraFlow Series of plastic valves leads the industry in long-term performance and reliability. With a flow range from .1 to 180 GPM and a selfcleaning, 150-mesh stainless steel filter screen, these unique valves are ideal for a multitude of potable and dirty water applications. A glass-reinforced nylon body and bonnet, stainless steel spring and hardware, and a rugged, nylon-reinforced Buna-N diaphragm add an extra dimension of toughness to this very durable family of valves.

KEY FEATURES & BENEFITS

UNIQUE STRAIGHT-THROUGH FLOW PATH

Provides extremely low friction loss

SLOW-CLOSING DESIGN

Reduces water hammer and resulting stress on the system

TOUGH GLASS-REINFORCED NYLON, STAINLESS STEEL AND **BRASS CONSTRUCTION**

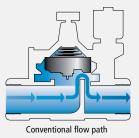
Provides durability and long life

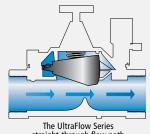
HIGH AND LOW-FLOW OPERATION

Ensures consistent performance in a variety of applications

SELF-FLUSHING, 150-MESH, STAINLESS STEEL FILTER SCREEN ON 1-, 1 1/2- AND 2-INCH MODELS

Provides consistent operation





straight-through flow path







FRICTION LOSS DATA

							F	low R	ate -	GPM
MODEL	SIZE	0.1	2	5	10	15	20	30	40	50
700B75	3/4"	0.38	0.38	0.86	1.22	2.03	3.27	6.75		
700-1	1″	2.20	1.59	1.80	2.41	2.23	1.84	3.22	5.58	8.59

Flow Rate - GF													ŝΡΜ
MODEL	SIZE	15	20	30	40	50	60	80	100	120	140	160	180
700-1.5	1 ½″	0.19	0.36	0.69	1.13	1.49	2.13	3.85	6.06	8.72	11.89		
700-2	2"			0.64	0.83	0.98	1.17	2.07	3.06	3.96	5.21	6.50	8.23

1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA. 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION

70	00 - XXX
MODEL	SIZE
700 - 700 UltraFlow electric valve	B75 - ¾" size 1 - 1" size 1.5 - 1½" size 2 - 2" size
Example: A 700 UltraFlow electric 1	" valve = 700-1

ADDED FEATURES

- Manual internal bleed
- Wide flow range
- Flow control allows precise flow adjustment and manual shutoff (not available on ¾-inch model)
- Compact, low-profile design
- Rugged nylon-reinforced Buna-N diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Encapsulated injection-molded solenoid with a captive hex plunger
- Unique three-way stainless steel bonnet screws with threaded brass inserts accept Phillips, flat-blade and hex-driver tools
- Five-year warranty

OPERATING SPECIFICATIONS

- Flow range: .1-180 GPM (700B-.75 & 700-1 can operate at .1 GPM)
- Pressure range: 10-150 psi (700-2 not recommended under 25 psi)

ELECTRICAL SPECIFICATIONS

- Solenoid: 24 V ac
- Inrush volt-amp: 24 V ac-9.6 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 V ac-4.8 VA
- Holding current: .2 amp

MODELS

Model	Description
700B75	¾" internal bleed flow control
700-1	1" internal bleed flow control
700-1.5	1½" internal bleed flow control
700-2	2" internal bleed flow control

DIMENSIONS

- **700B-.75:** H: 4 ¹/₂", W: 1 ⁹/₁₀", D: 3 ²/₅"
- **700-1:** H: 4 ¹/₂", W: 3", D: 4 ³/₅"
- **700-1.5:** H: 5 ¹/₂", W: 4 ³/₈", D: 6 ½"
- **700-2:** H: 7", W: 5 ½", D: 8"

- OmniReg® 5-30 psi regulator (OMR-30)
- OmniReg® 5-100 psi regulator (OMR-100)
- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL) Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Weatherproof gauge (SPK-100)

^{*} Optional accessories are field-installable. Must specify separately if required.







1", 1 1/2", 2" AND 3" PLASTIC MODELS

The Irritrol® 100 Series (Century PLUS) is an excellent example of a good valve getting better. Tracing its origin to the highly popular Century Series, the 100 Series delivers reliable performance with a host of enhanced features. Offered in a globe/angle configuration with sizes ranging from one to three inches, the 100 Series features a pressure range of 10-220 psi, optional modular pressure regulation, stainless steel metering, internal and external bleed, a nylon-reinforced Buna-N double-beaded diaphragm and an anti-contamination design for dirty water applications (available on all 102 Models).

KEY FEATURES & BENEFITS

TOUGH, GLASS-REINFORCED NYLON, STAINLESS STEEL AND BRASS CONSTRUCTION

Withstands high temperatures and system surges under pressure for long-term reliability

220 PSI PRESSURE RATING

Prevents water hammer and system damage in high-pressure installations

INTERNAL AND EXTERNAL BLEED (FLUSH MODE) Manual operation

ivialiuai operation

EXTERNALLY REMOVABLE SELF-CLEANING METERING SYSTEM

Provides consistent performance in recycled-water applications

ACCEPTS OMNIREG® MODULAR PRESSURE REGULATOR

Ensures consistent performance

102 ANTI-CONTAMINATION MODELS*

150-MESH EXTERNAL CONTROL WATER FILTER AND THREE-WAY SOLENOID

Provides non-continuous metering for recycled water applications

SELECTABLE NORMALLY OPEN OR NORMALLY CLOSED MODE (FACTORY SET AT NORMALLY CLOSED)

Provides flexibility (102 only)

CONTROL WATER FILTER

Allows easy external service

*Not compatible with IBOC®300-9V, OmniReg and DC Latching Solenoid







Self-cleaning/easy maintenance, each cycle cleans internal orifices. All parts are easily accessible without removing the valve from the system



FRICTION LOSS DATA

FI	οw	Rate	_	GPN
	UVV	nate	_	OF IV

						11000		31 111
MODEL	SIZE	GLOBE ANGLE	5	10	20	30	40	50
100P1	1″	G	6.30	4.20	3.20	4.10	7.20	10.90
102P1		Α	6.30	4.20	3.10	2.70	4.80	7.90

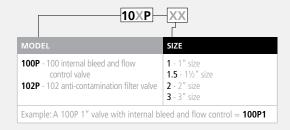
	Flow Rate - GPN											
MODEL	SIZE	GLOBE ANGLE	30	40	50	60	70	80	90	100	110	
100P1.5	1 ¹ /2"	G	1.60	2.30	3.60	5.20	7.00	9.20	11.70	14.40	17.50	
102P1.5		Α	1.30	1.60	2.80	4.00	5.50	7.10	9.00	11.00	13.30	

								H	low K	ate -	GPIVI
MODEL	SIZE	GLOBE ANGLE	80	90	100	110	120	130	140	150	175
100P2	2"	G	2.10	2.70	3.30	4.00	4.80	5.60	6.50	7.50	8.60
102P2		Α	1.20	1.60	2.00	2.40	2.80	3.30	3.90	4.40	5.00

Flow Rate - GPM											
MODEL	SIZE	GLOBE ANGLE	150	175	200	225	250	275	300		
100P3/	3"	G	2.50	3.00	4.10	5.30	6.70	8.30	10.10		
102P3		Α	1.90	2.40	3.30	4.30	5.50	6.90	8.50		

- 1) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
- 2) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION



ADDED FEATURES

- Flow control allows precise flow adjustment and manual shutoff
- Buna-N valve seat seal
- Encapsulated injection-molded solenoid with a captive hex plunger
- Positive O-ring seal on inlet plug prevents leaks without damaging seal threads
- Molded-in and anchored studs allow positive bonnet attachment and removal
- Brass flow control stem on 2- and 3-inch models
- Easily serviced without removal from the system
- Five-year warranty

OPERATING SPECIFICATIONS

- Flow range: 5-300 GPM
- Pressure range: 10-220 psi; 10-100 psi (102 models)

ELECTRICAL SPECIFICATIONS

- Solenoid: 24 V ac
- Inrush volt-amp: 24 V ac-9.6 VA
- Inrush current: .4 amp (102 models: .48 amp)
- Holding volt-amp: 24 V ac-4.8 VA
- Holding current: .2 amp (102 models: .24 amp)

MODELS

Model	Description
100P1	1" internal bleed, flow control
100P1.5	1½" internal bleed, flow control
100P2	2" internal bleed, flow control
100P3	3" internal bleed, flow control
102P1	1" anti-contamination filter
102P1.5	1½" anti-contamination filter
102P2	2" anti-contamination filter
102P3	3" anti-contamination filter

DIMENSIONS

- **100P1:** H: 6 ³/4", W: 3 ⁵/8", D: 4 ³/4"
- **102P1:** H: 7 ¹/2", W: 5", D: 4 ³/4"
- 100P1.5: H: 7 ¹/4", W: 3 ⁵/8", D: 4 ³/4"
- **102P1.5:** H: 7 ¹/2", W: 5", D: 4 ³/4"
- 100P2: H: 9 ¹/2", W: 6 ¹/8", D: 7 ³/4"
- **102P2:** H: 10 ¹/₄", W: 7 ¹/₂", D: 7 ³/₄"
- 100P3: H: 10 ³/4", W: 6 ¹/8", D: 8 ¹/4"
- **102P3:** H: 11 ¹/2", W: 7 ¹/2", D: 8 ¹/2"

- OmniReg® 5-30 psi regulator (OMR-30)
- OmniReg 5-100 psi regulator (OMR-100)
- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL)
 Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Weatherproof gauge (SPK-100)

^{*} Optional accessories are field-installable. Must specify separately if required.





2" AND 3" PLASTIC MODELS

Constructed of heavy-duty, glass-reinforced nylon, high grade stainless steel, brass and EPDM rubber materials, the 100 Series scrubber valves resist clogging and feature a patent-pending continuous scrubbing mechanism to actively fight dirt, algae and other particles from disrupting the functionality of the valve. The 100 Series scrubber valves are true dirty water irrigation valves, able to handle the harsh chemicals found in dirty water systems, such as chlorines, chloramines and water treated with ozones.

KEY FEATURES & BENEFITS

CONTINUOUS SCRUBBING FEATURE

Actively cleans the metering device for consistent valve operation

TOUGH, GLASS-REINFORCED NYLON, STAINLESS STEEL AND BRASS CONSTRUCTION

Withstands high temperatures and system surges under pressure for long-term reliability

FABRIC-REINFORCED EPDM DIAPHRAGM AND EPDM SEAT SEALDesigned to operate in virtually all water applications

RUGGED INTERNAL PLASTIC AND STAINLESS STEEL PARTS

Scrubber fan, nut and metering system chlorine and chemical resistant

COMPLETELY SERVICEABLE AND RETROFITTABLE

Diaphragm assembly may be replaced or retrofitted to previous models

220 PSI PRESSURE RATING

Prevents water hammer and system damage in high-pressure installations

INTERNAL AND EXTERNAL BLEED (FLUSH MODE)

Manual operation

EXTERNALLY REMOVABLE SELF-CLEANING METERING SYSTEM

Provides consistent performance in recycled-water applications

ACCEPTS OMNIREG® MODULAR PRESSURE REGULATOR

Ensures consistent performance

visit us at: www.irritrol.com



NEXT GENERATION SCRUBBER VALVE

Self-cleaning/easy maintenance, each cycle cleans internal orifices. All parts are easily accessible without removing the valve from the system



Continuous scrubbing turbine actively cleans the metering device for consistent valve operation in dirty water applications.

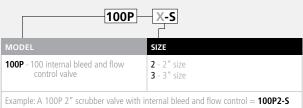
FRICTION LOSS DATA

								F	low R	late -	GPM
MODEL	SIZE	GLOBE ANGLE	80	90	100	110	120	130	140	150	175
100P2-S 2	2"	Α	2.80	3.80	4.50	5.50	6.30	7.60	8.70	10.30	13.10
	2	G	3.54	4.45	5.40	6.68	8.04	9.26	10.95	12.21	15.65

									<u>GPM</u>
MODEL	SIZE	GLOBE ANGLE	150	175	200	225	250	275	300
100P3-S	3"	Α	2.55	3.10	4.50	5.40	7.10	8.40	10.15
		G	2.97	4.04	5.37	6.35	7.99	9.35	11.26

1) See friction loss charts on pages 98 through 115 for details.

SPECIFYING INFORMATION



ADDED FEATURES

- Flow control allows precise flow adjustment and manual shutoff
- EPDM valve seat seal
- Encapsulated injection-molded solenoid with a captive hex plunger
- Positive O-ring seal on inlet plug prevents leaks without damaging seal threads
- Molded-in and anchored studs allow positive bonnet attachment and removal
- Brass flow control stem
- Easily serviced without removal from the system
- Five-year warranty

OPERATING SPECIFICATIONS

- Flow range: 5-300 GPM
- Pressure range: 10-220 psi (minimum pressure 20 psi)

ELECTRICAL SPECIFICATIONS

- Solenoid: 24 V ac
- Inrush volt-amp: 24 V ac-9.6 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 V ac-4.8 VA
- Holding current: .2 amp

MODELS

<u>Model</u>	<u>Description</u>
100P2-S	2" internal bleed, scrubber valve
100P3-S	3" internal bleed, scrubber valve
100P2-S-KIT	2" scrubber diaphragm kit
100P3-S-KIT	3" scrubber diaphragm kit

DIMENSIONS

- 100P2-S: H: 9 ¹/2", W: 6 ¹/8", D: 7 ³/₄"
- 100P3-S: H: 10 3/4", W: 6 1/8", D: 8 1/4"

- OmniReg® 5-30 psi regulator (OMR-30)
- OmniReg 5-100 psi regulator (OMR-100)
- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL)

 Note: Maximum pressure for:
 - Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Weatherproof gauge (SPK-100)

^{*} Optional accessories are field-installable. Must specify separately if required.

DRIP ZONE VALVE KITS



3/4" AND 1" WITH OR WITHOUT AVB

Not all drip zone kits are created equal, and with Irritrol[®] drip zone kits, you'll know why. Featuring the industry's most recognized valves that have long been a standard for more than 40 years, these all-inclusive kits come complete with all the necessary components you need for a drip zone. Coupled with the added reliability of the industry's most popular valves, these kits include a Y-filter, pressure regulator and all the essential fittings to make a complete drip zone.

KEY FEATURES & BENEFITS

COMPLETE WITH IRRITROL CONTROL VALVE

Over 40 years of industry-recognized dependability

IRRITROL Y-FILTER WITH A 150 MESH STAINLESS STEEL FILTER SCREEN

Proven performance for worry-free operation

PRESSURE REGULATOR

Provides consistent outlet pressure levels suitable for drip irrigation

AVAILABLE IN 11 VALVE CONFIGURATIONS IN 3/4" AND 1"
Multiple configurations to handle all installation variances

ALSO AVAILABLE IN "LESS VALVE" CONFIGURATIONS

Allows for installation versatility





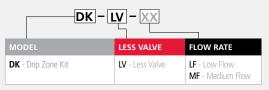
FRICTION LOSS DATA

Flow Rate - GPM

MODEL	GPM (Flow)	0.25	5	8	15	20
2711APRDK-LF	Friction loss (psi)	3	5	5	n/a	n/a
Z/TTAPKUK-LF	Min. Inlet (psi)	30	32	32	34	39
2711APRDK-MF	Friction loss (psi)	3	5	5	7	13
Z/TTAPKUK-IVIF	Min. Inlet (psi)	30	32	32	34	39
2713APRDK-LF	Friction loss (psi)	3	5	5	n/a	n/a
2/13APKUK-LF	Min. Inlet (psi)	30	32	32	34	39
2713APRDK-MF	Friction loss (psi)	3	5	5	5	8
2/13AFNDN-IVIF	Min. Inlet (psi)	30	32	32	32	35
2500DK-1-LF	Friction loss (psi)	3	3	3	n/a	n/a
2300DK-1-LF	Min. Inlet (psi)	30	30	30	32	34
2500DK-1-MF	Friction loss (psi)	3	3	3	4.5	7
2300DK-1-IVII	Min. Inlet (psi)	30	30	30	32	34
2507DK-LF	Friction loss (psi)	3	5	5	n/a	n/a
2307DK-LI	Min. Inlet (psi)	30	32	32	34	39
2507DK-MF	Friction loss (psi)	3	5	5	7	13
ZOU/DK-IVIF	Min. Inlet (psi)	30	32	32	34	39
700DK-1-LF	Friction loss (psi)	3	3	3	n/a	n/a
/00DK-1-LF	Min. Inlet (psi)	30	30	30	32	34
700DK-1-MF	Friction loss (psi)	3	3	3	4.5	7
700DK-1-WIF	Min. Inlet (psi)	30	30	30	32	34
700DK-075-LF	Friction loss (psi)	3	3	3	n/a	n/a
700DK-075-LF	Min. Inlet (psi)	30	30	30	32	34

SPECIFYING INFORMATION





ELECTRICAL SPECIFICATIONS

• Solenoid: 24 V ac

• Inrush volt-amp: 24 V ac-9.6 VA

• Inrush current: .4 amp

• Holding volt-amp: 24 V ac-4.8 VA

• Holding current: .2 amp

MODELS

Model

700DK-1-LF	1" 700 UltraFlow Inline Valve, Filter, Low Flow Regulator & Fittings
700DK-1-MF	1" 700 UltraFlow Inline Valve, Filter, Medium Flow Regulator & Fitting:
700DK-075-LF	34" 700 UltraFlow Inline Valve, Filter, Low Flow Regulator & Fittings
2500DK-1-LF	1" 2500 Valve, Filter, Low Flow Regulator & Fittings
2500DK-1-MF	1" 2500 Valve, Filter, Medium Flow Regulator & Fittings
2507DK-LF	3/4" 2507 Valve, Filter, Low Flow Regulator and Fittings
2507DK-MF	34" 2507 Valve, Filter, Medium Flow Regulator and Fittings
2711APRDK-LF	¾" 2711APR Valve, AVB, Filter, Low Flow Regulator & Fittings
2711APRDK-MF	3/4" 2711APR Valve, AVB, Filter, Medium Flow Regulator & Fittings
2713APRDK-LF	1" 2713APR Valve, AVB, Filter, Low Flow Regulator & Fittings
2713APRDK-MF	1" 2713APR Valve, AVB, Filter, Medium Flow Regulator & Fittings
DK-LV-LF	Low Flow Regulator & Fittings
DK-LV-MF	Medium Flow Regulator & Fittings

Description

OPTIONAL ACCESSORIES*

- Recycled-water solenoid kit (RW60-KIT); purple solenoid with purple warning tag
- DC latching solenoid (DCL)
 Note: Maximum pressure for a valve that utilizes latching solenoid is 120 psi.
- Weatherproof gauge (SPK-100)
- * Optional accessories are field-installable. Must specify separately if required.

MODEL	2711APRDK- LF	2711APRDK- MF	2713APRDK- LF	2713APRDK- MF	2500DK-1- LF	2500DK-1- MF	2507DK- LF	2507DK- MF	700DK-1- LF	700DK-1- MF	700DK-075- LF
Connection Size	3/4"	3/4"	1″	1"	1"	1″	3/4"	3/4"	1"	1"	3/4"
Control Valve Solenoid				24V ac, In	rush: 0.4 amps	, 11.5 V a, Hol	ding 0.20 amp	s, 5.75 V a			
Minimum Flow Rate	0.25 GPM	2 GPM	0.25 GPM	2 GPM	0.1 GPM	2 GPM	0.25 GPM	2 GPM	0.1 GPM	2 GPM	0.25 GPM
Maximum Flow Rate	8 GPM	20 GPM	8 GPM								
Maximum Pressure	150 psi	150 psi	150 psi								
Y-Filter Degree of Filtration	150 mesh	150 mesh	150 mesh								
Regulator-Preset Pressure	25 psi	25 psi	25 psi								
Thread Connection-Upstream	Female NPT	Female NPT	Female NPT								
Thread Connection-Downstream	Female NPT	Female NPT	Male NPT	Female NPT	Male NPT	Female NPT	Female NPT	Female NPT	Male NPT	Female NPT	Female NPT
Minimum Number of Emitters:											
0.5 GPH	30	240	30	240	12	240	30	240	12	240	30
1 GPH 2 GPH	15 8	120 60	15 8	120 60	6 3	120 60	15 8	120 60	6	120 60	15 8
Maximum Number of Emitters: 0.5 GPH 1 GPH 2 GPH	960 490 240	2400 1200 600	960 490 240								

Note: Consult your local plumbing code for backflow prevention requirements.

^{*} AVB = Atmospheric Vacuum Breaker (Anti-siphon Valve)





This pressure-regulating device enables the user to quickly and accurately set the exact downstream pressure required for any application.

KEY FEATURES & BENEFITS

MAINTAINS CONSTANT DOWNSTREAM PRESSURE, REGARDLESS OF WIDELY VARYING INLET PRESSURE

For consistent operation of heads

ONE MODEL FITS ALL HEAVY-DUTY COMMERCIAL 100 SERIES (CENTURY PLUS), 700 SERIES (ULTRAFLOW®), 200B AND 311A SERIES VALVES*

Streamlines inventory requirements

REQUIRES ONLY 1 GPM TO OPERATE

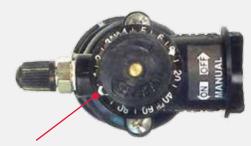
Ideal for low-flow applications

"DROP IN" INSTALLATION IS FAST AND EASY, REQUIRING TIGHTENING OF ONLY TWO CAPTURE SCREWS

For reduced labor time

 Compatible with Century PLUS (excluding anti-contamination models), 700 UltraFlow® (1", 1½" and 2") and 311A manufactured after 1/1/96; 700 UltraFlow (¾") manufactured after 5/4/96; and 200B manufactured after 12/1/98.

EASILY KEEP DOWNSTREAM PRESSURE CONSTANT



Simply turn the dial to the desired pressure

ADDED FEATURES

- Clearly marked dial settings permit precise control of downstream pressure
- Desired pressure may be set with water on or off
- Delivers an accuracy of ±3 psi
- Low-profile design permits use in applications with limited space
- Schrader valve test port is easily accessible for in-line use
- Manufactured of heavy-duty, corrosion-resistant glassfilled nylon
- Easily serviced internal module
- Stainless steel and brass hardware
- Vandal cap to avoid unauthorized use
- Five-year warranty

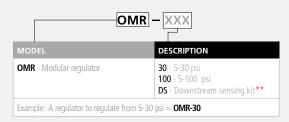
OPERATING SPECIFICATIONS

- Flow range: 1 to 300 GPM
- Inlet pressure range: Up to 200 psi
- Pressure regulation:
 - OMR-30: 5 to 30 psi, OMR-100: 5 to 100 psi
- Inlet pressure to be 10 psi greater than outlet pressure

MODELS

Model	Description
OMR-30	Modular regulator 5-30 psi
OMR-100	Modular regulator 5-100 psi
OMR-DS	Downstream sensing kit

SPECIFYING INFORMATION



** This accessory may be used with either the OMR-30 or OMR-100 model to sense downstream pressure



ACCESSORIES



R811-24VACG

- Captive hex plunger feature
- 24 V ac, .40 amp inrush, .20 amp holding



RW60-KIT

- Purple solenoid with purple warning tag
- Captive hex plunger feature
- 24 V ac, .40 amp inrush, .20 amp holding



DCL SOLENOID

DC latching solenoid for Hardie[®], Richdel[®] and Irritrol[®] valves used with IBOC[®] and IBOC[®] Plus Series controllers



SPK-100

100 psi weatherproof gauge (fits OmniReg® and all Hardie® and Richdel® pressure regulators)



SPK-HR1

Prepackaged repair kit includes diaphragm assembly, O-ring, metering rod and fasteners (bulk 24 per)



R205KIT

Prepackaged repair kit for 205 Series non-flow control valves. Includes diaphragm assembly, bonnet assembly, fasteners and spring



R205TFKIT

Prepackaged repair kit for 205 Series flow control valves. Includes diaphragm assembly, bonnet assembly, fasteners and spring



2400-45

Threaded nut-ring wrench speeds assembly and service of 2400, 2600, 2711DPR and 2713DPR valves



SPK-700-X

Prepackaged repair kit for UltraFlow[®] Series valves includes diaphragm assembly, support ring, seat seal, O-rings and fasteners (bulk 24 per; repair instructions and parts breakdown included)



SPK-100-X

Prepackaged repair kit for Century Series valves includes diaphragm assembly, O-ring, metering rod and fasteners (bulk 24 per; repair instructions and parts breakdown included)



R100PX

Prepackaged repair kit for Century PLUS Series valves includes diaphragm assembly, O-rings, metering rod and fastening nuts (bulk 24 per; repair instructions and parts breakdown included)



100P-S-KIT

100 (Century) Series Scrubber valve diaphragm assembly kit. Complete with scrubbing turbine, EPDM diaphragm, EPDM seat seal and 316SS filter. Available in 2" and 3", fully assembled and ready to drop in a Century Series valve.

SPK-700X — XX				
	SIZE			
SPK-700B	0.75"			
SPK-700	1"			
SPK-700	1.5"			
SPK-700	2"			

SPK-100 — XX				
	SIZE			
SPK-100	1"			
SPK-100	1.5"			
SPK-100	2"			
SPK-100	3"			

R100	P XX
	SIZE
R100P R100P R100P R100P	1" 1.5" 2" 3"

100P - X - S-k		
	SIZE	
100P	2"	
100P	3"	

With taller pop-up heights and automatic arc return, Irritrol® rotors stand tall in the yard and in the industry. Add to that, easy installation and adjustment features and you can see why durable Irritrol rotors are rapidly becoming the contractor's choice.

AT-A-GLANCE PLATINUM SPORT 430R TITAN 550R pgs 70 pgs 71 pgs 72-73 pgs 74-75 TURF SHRUBS/ **GROUND COVER** APPLICATION **SLOPES RUBBER COVER FOR** ATHLETIC FIELDS FULL/PART CIRCLE IN ONE SPRINKLER **RADIUS** 20' - 35' 32' - 45' 25' - 50' 46' - 75' INLET SIZE 1/2" 1/2" or 3/4" 3/4" 1" PRESSURE RATING 30 – 50 psi 30 - 50 psi 25 – 65 psi 40 - 100 psi STAINLESS STEEL RISER **CHECK VALVE FEATURES** RECYCLED WATER OPTION SHRUB HIGH POP AUTOMATIC RETURN 4" 3" 5" 5" **POP-UP HEIGHT** WARRANTY 2 Years 2 Years 5 Years **5** Years





1/2" GEAR-DRIVEN ROTOR

Rapidly becoming a contractor favorite, the 430R rotor from Irritrol® offers everything you would expect from a ½" rotor. When your application calls for more than ordinary spray heads, but not enough for large rotors, we offer the 430R. With a familiar arc setting and the ability to quick check the left and right stops, the 430R is sure to save time on installation.

KEY FEATURES & BENEFITS

FAMILIAR TOP ADJUSTMENT, WET OR DRY
For fast convenient installation

REVERSING FULL- AND PART-CIRCLE OPERATION Allows you to adjust the rotor from 40° to 360°

PRESSURE-ACTIVATED WIPER SEAL

Reduces flow-by at pop-up and eliminates leaking. Ideal for low flow applications

WIDE SELECTION OF NOZZLES

5 interchangeable nozzles to cover varying flow requirements

POSITIVE LEFT AND RIGHT STOPS (FIXED RIGHT STOP)

Reduces set-up time by allowing you to quick check the arc

STAINLESS STEEL ADJUSTMENT SCREW

Allows up to 25% radius reduction

RATCHETING RISER

For easy arc adjustment



NO SPECIAL TOOLS REQUIRED

All arc adjustments made from the top with a standard screwdriver reduces set up time





OPERATING SPECIFICATIONS

- Inlet: 1/2" female-threaded NPT
- Adjustable arc range: 40° to 360°
- Flow range: .8 − 3.4 GPM
- Recommended operating pressure: 30 50 psi
- Maximum operating pressure: 60 psi
- Overall height (retracted): 6"
- Radius: 20' to 35'
- Standard nozzle trajectory: 25°
- 5 interchangeable nozzles
- Riser height: 4"
- Two-year warranty

MODELS

Model	Description
430R	½" inlet with 4" pop-up

PERFORMANCE DATA

					1
Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. ■ in/h	Precip. 🛦 in/h
	30	20	0.80	0.39	0.44
0.75	40	21	0.90	0.39	0.45
	50	22	1.00	0.40	0.46
	30	26	1.00	0.28	0.33
1.0	40	27	1.10	0.29	0.34
	50	28	1.30	0.32	0.37
	30	29	1.30	0.30	0.34
1.5	40	30	1.50	0.32	0.37
	50	31	1.70	0.34	0.39
	30	30	1.70	0.36	0.42
2.0	40	31	2.00	0.40	0.46
	50	31	2.30	0.46	0.53
	30	34	2.60	0.43	0.50
3.0	40	35	3.00	0.47	0.54
	50	35	3.40	0.53	0.65

- 1. Precipitation rates based on half-circle operation
- 2. square spacing based on 50% diameter of throw
- 3. \blacktriangle triangular spacing based on 50% diameter of throw

Note: Data collected in zero wind conditions

SPECIFYING INFORMATION

430R				
MODEL	INLET			
430R - Gear-driven rotor	½" Female Threaded NPT			
Example: 430R rotor, ½" female threaded, 4" height = 430R				









COMBINATION 1/2" OR 3/4" IMPACT ROTOR

Heavy-duty construction combined with a host of convenient features makes this rotor ideal for a broad range of residential and light commercial applications.

KEY FEATURES & BENEFITS

DOUBLE-WEIGHTED SPRAY GUIDE ARM

Controls stream and prevents side splash onto buildings and walkways

5 INTERCHANGEABLE, COLOR-CODED MPR NOZZLES

Pre-installed with black 3.0 gpm nozzle (no tools needed to change nozzles)

HEAVY-DUTY, HIGH IMPACT CASE

With sturdy, reinforced ribbed design

PRESSURE-ACTIVATED WIPER SEAL

Assures reliable pop-up and pop-down

RADIUS REDUCTION SCREW

Allows for up to 25% in-field radius reduction

UNIQUE LIP CASE DESIGN

Aids in setting proper installation height, prevents grass and weeds from growing into head and minimizes backwash

REPLACES COMPETITIVE SPRINKLERS

Simple upgrade for other impacts, including Rain Bird® Maxi-Paw®

STRAIGHT FLOW-THROUGH PATH

Ensures low pressure loss and positive action—even in very dirty water conditions

OPERATING SPECIFICATIONS

- Filter screen to prevent clogging
- Removable cap for easy servicing and debris removal
- Full- and part-circle adjustable from 20° to 360°
- Radius: 32' 45'
- Flow rate: 1.50–7.50 GPM
- Recommended operating pressure range: 30–50 psi
- Maximum operating pressure: 60 psi
- Recommended spacing: 22' to 45'
- Trajectory: 18°
- Pop-up to nozzle: 3"
- Combination ½" or ¾" female-threaded inlet
- Dimensions:
 - Body diameter: 21/2"-5"
 - Cap diameter: 5'
 - Height: 9 3/10"
- Two-year warranty

MODELS

Model Description
430R ½" inlet with 4" pop-up

TITAN ROTOR - Standard Nozzle

Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. ■ in/h	Precip. ▲ in/h
	30	32	1.5	0.16	0.14
1.5 (Orange)	40	35	1.8	0.16	0.14
	50	36	2.3	0.20	0.17
	30	33	2.0	0.20	0.18
2.0 (Red)	40	37	2.2	0.18	0.15
	50	40	2.5	0.17	0.15
	30	35	2.9	0.26	0.23
3.0 (Black)	40	39	3.6	0.26	0.23
	50	41	5.0	0.26	0.23
	30	38	3.8	0.29	0.25
4.0 (Blue)	40	41	4.2	0.28	0.24
	50	42	5.1	0.32	0.28
	30	39	5.8	0.42	0.37
6.0 (Green)	40	43	6.5	0.39	0.34
,	50	45	7.5	0.41	0.36







3/4" GEAR-DRIVEN ROTOR

The new Irritrol® 550R rotor delivers basic simplicity and dependable action all in one rotor. With its proven ¾" gear-driven design, 50' of watering radius and a full 5" pop-up, this rotor just gets more done. Installation is made simple with Irritrol's familiar top arc adjustment and all-in-one full- and part-circle operation from 40 to 360 degrees. And, with the ability to quick check the arc with positive left and right stops, set-up time is further reduced. The 550R comes with a wide selection of nozzles (8 standard and 4 low angle nozzles) making it the ideal rotor for your everyday installations.

KEY FEATURES & BENEFITS

FAMILIAR TOP ADJUSTMENT, WET OR DRY

For fast convenient installation

REVERSING FULL- AND PART-CIRCLE OPERATION

Allows you to adjust the rotor from 40° to 360°

NON-FLUSHING WIPER SEAL

Reduces leaks caused by debris trapped under seal

ALL ADJUSTMENTS MADE WITH A STANDARD SCREWDRIVER

No special tools required

72

STANDARD RUBBER COVER

Provides added protection against debris and keeps playing areas safe

WIDE SELECTION OF NOZZLES

8 standard and 4 low angle nozzles included with each rotor to handle a wide range of applications

POSITIVE LEFT AND RIGHT STOPS (FIXED LEFT STOP)

Reduces set-up time by allowing you to quick check the arc

OPTIONAL CHECK VALVE HOLDS UP TO 7' OF ELEVATION CHANGE

Eliminates water waste

FULL 5" POP-UP

Fitsin competitive footprint without extra digging

visit us at: www.irritrol.com





550R Rotor - Standard Nozzle

55UK KOTOr - Standard Nozzie							
Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. in/h	Precip. 🛦 in/h		
	25	33	1.15	0.20	0.23		
1.5	35	34	1.38	0.23	0.27		
	45	35	1.59	0.25	0.29		
	55	35	1.74	0.27	0.32		
	65	36	1.88	0.28	0.32		
	25	35	1.45	0.23	0.26		
	35	36	1.80	0.27	0.31		
2.0	45	37	2.12	0.30	0.34		
	55	37	2.30	0.32	0.37		
	65	37	2.58	0.36	0.42		
	25	35	1.75	0.28	0.32		
	35	36	2.20	0.33	0.38		
2.5	45	37	2.55	0.36	0.41		
	55	37	2.80	0.39	0.45		
	65	37	3.05	0.43	0.50		
	25	36	2.20	0.33	0.38		
	35	38	2.60	0.35	0.40		
3.0	45	40	3.05	0.37	0.42		
	55	40	3.52	0.42	0.49		
	65	40	3.80	0.46	0.53		
	25	37	2.95	0.41	0.48		
	35	40	3.55	0.43	0.49		
4.0	45	42	4.10	0.45	0.52		
	55	42	4.45	0.49	0.56		
	65	43	4.85	0.50	0.58		
	25	39	3.75	0.47	0.55		
	35	41	4.50	0.52	0.60		
5.0	45	43	5.10	0.53	0.61		
	55	45	5.75	0.55	0.63		
	65	45	6.10	0.58	0.67		
	25	39	4.20	0.53	0.61		
	35	43	5.20	0.55	0.63		
6.0	45	46	6.05	0.60	0.69		
	55	47	6.65	0.58	0.67		
	65	48	7.25	0.61	0.70		
	25	36	5.75	0.85	0.99		
	35	43	7.10	0.74	0.85		
8.0	45	47	8.05	0.70	0.81		
	55	48	8.95	0.75	0.86		
	65	50	9.70	0.75	0.86		

550R Rotor - Low Angle Nozzle

SSOR ROLL LOWY HIGHE HOLLIC							
Nozzle	Pressure	Radius	Flow	Precip.	Precip. 🛦		
	psi	ft.	GPM	in/h	in/h		
1.0 LA	25	25	0.74	0.23	0.26		
	35	28	0.94	0.23	0.27		
	45	28	1.02	0.23	0.27		
	55	29	1.14	0.26	0.30		
	65	29	1.25	0.29	0.33		
	25	27	1.10	0.29	0.34		
	35	30	1.35	0.29	0.33		
1.5 LA	45	31	1.52	0.30	0.35		
	55	31	1.75	0.35	0.40		
	65	31	1.90	0.38	0.44		
	25	29	1.40	0.32	0.37		
	35	31	1.72	0.34	0.40		
2.0 LA	45	32	2.05	0.39	0.45		
	55	33	2.25	0.40	0.46		
	65	33	2.45	0.43	0.50		
	25	29	2.20	0.50	0.58		
	35	33	2.60	0.46	0.53		
3.0 LA	45	34	3.05	0.51	0.59		
	55	36	3.40	0.51	0.58		
	65	36	3.70	0.55	0.63		

- 1. Precipitation rates based on half-circle operation
- 2. square spacing based on 50% diameter of throw
- 3. ▲ triangular spacing based on 50% diameter of throw

Note: Data collected in zero wind conditions

OPERATING SPECIFICATIONS

- Inlet: 3/4" female-threaded NPT
- Adjustable arc range: 40° to 360°
- Flow range: .74 9.70 gpm
- Recommended operating pressure: 45 psi
- Precipitation rate: .20 .99 inches per hour
- Overall height (retracted): 7 ³/8"
- Radius: 25' 50'
- Pressure range: 25 to 70 psi
- Standard nozzle trajectory: 25°
- Low angle nozzle trajectory: 12°
- 8 standard and 4 low angle nozzles included (unit comes with 3.0 nozzle pre-installed)
- Riser height: 5"
- Five-year warranty

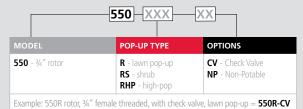
MODELS

Model	Description
550R	¾" inlet, 5" lawn pop-up
550RS	³¼" inlet, shrub
550RHP	¾" inlet, 12" high-pop
550R-CV	3/4" inlet, 5" lawn pop-up w/check valve
550R-NP	3/4" inlet, 5" lawn pop-up w/non-potable cover

OPTIONAL ACCESSORIES

- Recycled-water indicator cover (purple)
- Field-installable check valve (102-7714)

SPECIFYING INFORMATION



SAVE VALUABLE SET-UP TIME









1" GEAR-DRIVEN ROTOR

The Irritrol[®] Platinum Sport Series rotor is designed for reliable performance and superior coverage in light commercial and commercial applications. A full 5 ¾-inch pop-up height provides superior coverage in tall grass, while full- and part-circle operation in one unit reduces inventory requirements and increases convenience. Add to this a choice of seven nozzle sizes and it's easy to see why the Platinum Sport Series is quickly becoming an industry favorite.

KEY FEATURES & BENEFITS

FULL 5-INCH POP-UP HEIGHT TO NOZZLE Clears tall grass

REVERSIBLE CHECK VALVE

Eliminates low-head drainage

STANDARD RUBBER COVER

Provides added protection against debris and keeps playing areas safe

ARCVIEW ARC INDICATOR

Simplifies adjustments

ADJUSTABLE PART-CIRCLE AND UNIDIRECTIONAL FULL-CIRCLE COVERAGE IN ONE UNIT (45°-360°)

Reduces inventory requirements

AUTOMATIC ARC RETURN

Protects against tampering and vandalism

WATER-LUBRICATED GEAR DRIVE ASSEMBLY

Enhances reliability

TOP ADJUST, WET OR DRY

For fast, convenient installation

OPTIONAL STAINLESS STEEL RISER

Helps to deter vandalism and provides longer life





	Pressure	Radius	Flow	Precip.	Precip. 🛦
Nozzle	psi	ft.	GPM	in/h	in/h
	40	46	6.8	0.62	0.72
7.0	50	49	7.4	0.65	0.75
	60	49	8.1	0.68	0.78
	70	50	8.9	0.71	0.82
	80	52	9.7	0.72	0.83
	90	52	10.3	0.73	0.84
	100	53	10.9	0.72	0.83
	40	47	7.5	0.66	0.76
	50	51	8.3	0.64	0.73
	60	50	8.9	0.66	0.76
9.0	70	52	9.8	0.70	0.81
	80	54	10.5	0.69	0.80
	90	53	11.2	0.71	0.82
	100	54	11.8	0.73	0.84
	40	50	10.0	0.77	0.89
	50	53	10.5	0.78	0.90
	60	56	11.5	0.79	0.91
12.0	70	59	12.5	0.83	0.96
	80	60	13.5	0.86	0.99
	90	61	14.3	0.88	1.03
	100	63	15.2	0.90	1.04
	40	52	13.4	0.92	1.06
	50	57	15.0	0.92	1.06
	60	60	15.8	0.90	1.04
16.0	70	61	14.1	0.95	1.09
10.0	80	64	18.4	0.95	1.10
	90	64	19.7	0.98	1.14
	100	66	20.8	1.01	1.17
	40	52	16.1	1.10	1.27
	50	57	18.4	1.05	1.22
	60	61	19.6	1.05	1.21
20.0	70	64	21.0	1.09	1.26
	80	66	22.6	1.03	1.19
	90	68	24.0	1.06	1.23
	100	70	25.3	1.09	1.25
	40	54	15.5	1.10	1.27
	50	60	17.7	0.95	1.09
	60	64	19.8	0.96	1.11
24.0	70	66	21.6	0.99	1.14
	80	68	23.2	1.00	1.15
	90	70	24.9	1.04	1.20
	100	72	26.3	1.00	1.16
	40	55	19.3	1.23	1.42
	50	64	22.0	1.00	1.16
	60	71	23.8	0.91	1.05
27.0	70	72	25.6	0.95	1.10
27.0	80	73	27.3	0.99	1.14
	90	74	29.0	1.02	1.18
	100	75	30.5	1.05	1.21



- 1. Precipitation rates based on half-circle operation
- 2. square spacing based on 50% diameter of throw
- 3. ▲ triangular spacing based on 50% diameter of throw

 Note: Data collected in zero wind conditions



ADDED FEATURES

- Threaded cap-retained riser assembly
- Variable reversing stator
- Seven nozzle sizes (7-27 GPM); pre-installed with 12.0 nozzle
- Small 2.2" exposed surface diameter
- Nozzle support/breakup screw
- Riser pull-up feature on top of nozzle base
- Adjustment/pull up tool supplied
- Locking cap screw
- Five-year warranty

OPERATING SPECIFICATIONS

- Precipitation rate: .62-1.42 inches per hour
- Radius: 46'-75'
- Flow rate: 6.8-30.5 GPM
- Recommended operating pressure range: 40-100 psi
- Optimum operating pressure: 70 psi
- Inlet size: 1" threaded NPT or 1" BSP
- Nozzle trajectory: 25°
- Arc adjustment: 45°-360° (unidirectional at 360°)

DIMENSIONS

- Pop-up height to nozzle: 5"
- Body height: 8.8"
- Rubber cover diameter: 2.2"
- Body diameter: 2.7"

MODELS

Description
1" inlet sport field rotor
1" inlet, stainless steel sport field rotor
1" inlet sport field rotor w/recycled purple cover
1" inlet stainless steel with recycle purple cover

OPTIONAL ACCESSORIES

• Recycled-water indicator cover (purple)

SPECIFYING INFORMATION



ARC INDICATOR FEATURE

Top arc indicator allows you to see the arc setting, saving valuable set up time

Quite simply—our spray heads pop up, do their job, then disappear. Just like they're supposed to. And they do it year after year, season after season. Durable construction makes Irritrol® spray heads extremely reliable. And their design makes them easy to install and use.

AT-	-A-GLANCE	† † † † † † † † † † † † † † † † † † †	I-PRO*	PRO-VAN NOZZLES	SPECIALTY NOZZZLES
		pgs 78-79	NOZZLES pgs 80-81	pgs 82-83	pgs 81
	2"	pgs 70-79	pgs 60-61	pgs 02-03	pgs 01
	3"	•			
POP-UP HEIGHT	4"	•			
	6"	•			
	12"	•			
	SIDE INLET	(6" and 12" models)			
	CHECK VALVE OPTION	•			
FEATURES	PRESSURE REGULATOR OPTION	(Excluding 3" model)			
TEMOLES	PRE-INSTALLED NOZZLE OPTION				
	RECYCLED WATER OPTION	(Field-installable)			
	RETROFIT OPTION (LESS BODY)	(Excluding 3" model)			
RADIUS			5′, 8′, 10′, 12′, 15′	8′, 10′, 12′, 15′, 17′	Specialty
ARC			1/4, 1/3, 1/2, 2/3, 3/4, Full*	Adjustable	9-EST, 9-CST, 9-SST, 15-EST, 15-CST, 15-SST
FLOW RANGE			.06-4.75 GPM	.53-4.60 GPM	.41-1.35 GPM
	ECOMMENDED RATING PRESSURE		20-50 psi	20-50 psi	20-40 psi
	WARRANTY	5 years	5 years	5 years	5 years







3", 4", 6" AND 12" MODELS

Irritrol's I-PROTM Series spray heads combine a pressure-activated wiper seal and advanced formula lubricant that virtually eliminates troublesome stick ups. Add a unique tapered lip design that prevents debris from entering the body and you have a spray head with superior performance. It's rugged and reliable with a textured body style for a non-slip grip and even easier installation. I-PRO offers a 4", 6" and 12" replacement spray head that allows a complete retrofit without having to purchase the body — it even fits the Rain Bird[®] 1800[®] Series body. Available in four pop-up heights with side inlet, pressure regulation and check valve options, the I-PRO Series fits most landscape applications.

KEY FEATURES & BENEFITS

PRESSURE-ACTIVATED SEAL WITH LUBRICANT ADDITIVE

Cleans debris from stem, reduces flow-by during pop-up and prevents leaking between cap and body. Extra lubricant additive further eliminates stick-ups

PRE-INSTALLED IN-RISER PRESSURE REGULATOR (OPTIONAL)

Maintains optimum nozzle performance at 30 psi and eliminates misting in varying pressure applications

PRE-INSTALLED CHECK VALVE (OPTIONAL)

Prevents low-head drainage, eliminating flood or erosion damage by keeping water in lateral pipes in elevation changes up to 14'

RETROFITTABLE RISER

Fits Rain Bird 1800 Series body

STURDY AND ROBUST, TEXTURED BODY

Provides for easy installation with a non-slip grip

SIDE AND BOTTOM INLETS ON 6" AND 12" MODELS (6" ALSO AVAILABLE IN NON-SIDE INLET)

Reduces installation time

HEAVY-DUTY, STAINLESS STEEL RETRACTION SPRING

Ensures positive pop-down

MALE-THREADED RISER

Compatible with any female-threaded nozzle in the industry

PRE-INSTALLED FLUSH PLUG

Makes system flushing a breeze and allows for easy nozzle installation

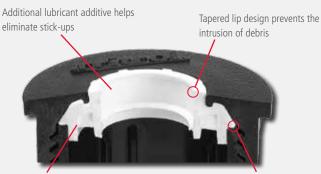
RATCHETING RISER

Easiest ratchet in the market, even while hands are wet, yet won't come out of adjustment!

visit us at: www.irritrol.com



SUPERIOR PERFORMING WIPER SEAL



Pressure-activated lip seal ensures a positive seal around the riser and reduces "flow-by"

Lip creates positive seal to prevent body to cap leaks

REPLACEMENT SPRAY AVAILABLE (4", 6" & 12")

Why pay for a body you're just going to throw away? I-PRO offers a 4", 6" and 12" replacement spray head that is everything but the body! Ideal for maintenance, this spray head also fits right in the can of the Rain Bird® 1800® series for an easy retrofit. With features that are contractor-driven and field-proven, the I-PRO Series is sure to save you time and money.



1800 Series







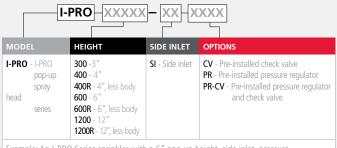


Drop in I-PRO replacement and retrofit is complete

COMPLETE FAMILY OFFERING Available in four pop-up heights with side inlet, pressure regulation and check valve options, I-PRO is a spray series for most landscape applications. I-PRO600R

SPECIFYING INFORMATION

I-PRO1200R



Example: An I-PRO Series sprinkler with a 6" pop-up height, side inlet, pressure regulation option and check valve = I-PRO600-SI-PR-CV

SPECIFICATIONS

- Inlet size: 1/2" female NPT threads
- Exposed diameter: 2 1/4"
- Body diameter: 1 5/8"
- Body height:
 - I-PRO300: 4 ⁷/8"
 - I-PRO400: 5 3/4"
 - I-PRO600: 9 1/4"
 - I-PRO1200: 16"
- Side inlet: 4 3/8" from center of side inlet to top of cap
- Recommended working pressure:
 - Standard: 20-50 psi (max 75 psi)
 - CV: 25-50 psi (max 75 psi)
 - PR: 30-70 psi (max 75 psi)
- Precipitation rate:
 - Spacing: 4' 15'
 - Flow-by: 0 at 10 psi or greater; .1 GPM otherwise

Description

• Five-year warranty

MODELS Model

I-PRO300	3" Pop-Up
I-PRO400	4" Pop-Up
I-PRO400-CV	4" Pop-Up w/Check Valve
I-PRO400-PR	4" Pop-Up w/Pressure Regulator
I-PRO400-PR-CV	4" Pop-Up w/Pressure Regulator and Check Valve
I-PRO600	6" Pop-Up
I-PRO600-CV	6" Pop-Up w/Check Valve
I-PRO600-PR	6" Pop-Up w/Pressure Regulator
I-PRO600-PR-CV	6" Pop-Up w/Pressure Regulator and Check Valve
I-PRO600-SI	6" Pop-Up w/Side Inlet
I-PRO600-SI-PR	6" Pop-Up w/Side Inlet and Pressure Regulator
I-PRO1200-SI	12" Pop-Up w/Side Inlet
I-PRO1200-SI-CV	12" Pop-Up w/Side Inlet and Check Valve
I-PRO1200-SI-PR	12" Pop-Up w/Side Inlet and Pressure Regulator
I-PRO1200-SI-PR-CV	12" Pop-Up w/Side Inlet, Pressure Regulator and Check Valve
I-PRO400R	4" Pop-Up Replacement
I-PRO400R-CV	4" Pop-Up Replacement w/Check Valve
I-PRO400R-PR	4" Pop-Up Replacement w/Pressure Regulator
I-PRO400R-PR-CV	4" Pop-Up Replacement w/Pressure Regulator and Check Valve
I-PRO600R	6" Pop-Up Replacement
I-PRO600R-CV	6" Pop-Up Replacement w/Check Valve
I-PRO600R-PR	6" Pop-Up Replacement w/Pressure Regulator
I-PRO600R-PR-CV	6" Pop-Up Replacement w/Pressure Regulator and Check Valve
I-PRO1200R	12" Pop-Up Replacement
I-PRO1200R-CV	12" Pop-Up Replacement w/Check Valve
I-PRO1200R-PR	12" Pop-Up Replacement w/Pressure Regulator
I-PRO1200R-PR-CV	12" Pop-Up Replacement w/Pressure Regulator

OPTIONAL ACCESSORIES

• Recycled-water indicator cap (I-PRO-NPC)

and Check Valve

• Field-installable check valve (I-PRO-CV)







MPR NOZZLES

Irritrol's I-PROTM nozzles with Matched Precipitation Rate are designed to simplify your design process while delivering the precision performance you've come to expect. An I-PRO MPR nozzle ensures even water distribution within an arc family allowing for accurate control of precipitation rate, radius and flow. Runoff and over-watering are both dramatically reduced. And compared to the competition, these I-PRO nozzles give an equal to or lower on-average precipitation and flow rate adding greater irrigation efficiency. Color-coded on top for quick radius identification, users will be able to easily verify proper nozzle installation—whether the system is on or off. Available in 5 radius sizes and 6 arc settings*, I-PRO nozzles are female-threaded and include a ribbed-edge design for a non-slip grip. Compatible with all Irritrol spray heads as well as any male-threaded riser in the industry, Irritrol's I-PRO nozzle series are just the right nozzles to get the job done.

KEY FEATURES & BENEFITS

MATCHED PRECIPITATION RATES

Ensures even water distribution within each family

LOW-FLOW RATES

Allow for more sprinklers to be installed on the same zone

COLOR-CODED TOP

For quick and easy radius identification

FEMALE-THREADED

Compatible with any male-threaded riser in the industry

RIBBED-EDGE DESIGN

Provides for a non-slip grip



*5', 8' and 10' nozzles are not available in TT and TQ arc settings



PERFORMANCE DATA

5' Series with 0° Trajectory

			-		
Nozzle	Pressure psi	Radius ft.	GPM	Precip. in/h	Precip. ▲ in/h
IPN-5F	20	4	0.27	1.62	1.87
	30	5	0.41	1.58	1.82
	40	6	0.49	1.30	1.50
	50	6	0.57	1.53	1.77
	20	4	0.11	1.27	1.46
IPN-5H	30	5	0.20	1.54	1.78
	40	6	0.24	1.29	1.49
	50	6	0.28	1.52	1.75
	20	4	80.0	1.37	1.58
IPN-5T	30	5	0.13	1.50	1.73
	40	6	0.17	1.39	1.61
	50	6	0.22	1.74	2.01
	20	4	0.06	1.34	1.54
IPN-5Q	30	5	0.10	1.54	1.78
	40	6	0.13	1.43	1.65
	50	6	0.17	1.78	2.06

10' Series with 12° Trajectory

Nozzle	pressure psi	Radius ft.	GPM	Precip. in/h	Precip. ▲ in/h
IPN-10F	20	9	1.22	1.45	1.68
	30	10	1.64	1.58	1.82
	40	11	1.77	1.41	1.63
	50	12	2.04	1.36	1.57
	20	9	0.68	1.63	1.88
IPN-10H	30	10	0.81	1.56	1.80
	40	11	0.97	1.54	1.78
	50	12	1.13	1.51	1.74
	20	9	0.43	1.53	1.76
IPN-10T	30	10	0.53	1.53	1.77
	40	11	0.66	1.58	1.83
	50	12	0.76	1.53	1.77
	20	9	0.30	1.43	1.65
IPN-10Q	30	10	0.40	1.54	1.78
	40	11	0.50	1.59	1.84
	50	12	0.60	1.60	1.85
	50	12	0.60	1.60	1.85

15' Series with 27° Trajectory

15 Series With 27 Hajectory						
Nozzle	Pressure psi	Radius ft.	GPM	Precip. in/h	Precip. 🛦 in/h	
	20	14	2.95	1.45	1.67	
IPN-15F	30	15	3.73	1.60	1.84	
	40	16	4.35	1.64	1.89	
	50	16	4.75	1.78	2.06	
IDAL 1ETO	20	14	2.23	1.46	1.68	
IPN-15TQ	30	15	2.76	1.57	1.81	
	40	16	3.18	1.59	1.84	
	50	16	3.61	1.80	2.08	
IDNI 1FTT	20	14	1.95	1.44	1.66	
IPN-15TT	30	15	2.41	1.55	1.79	
4	40	16	2.91	1.64	1.90	
	50	16	3.11	1.75	2.03	
IDNI 1511	20	14	1.51	1.48	1.71	
IPN-15H	30	15	1.82	1.56	1.80	
	40	16	2.23	1.68	1.93	
	50	16	2.36	1.77	2.05	
	20	14	1.03	1.51	1.75	
IPN-15T	30	15	1.19	1.53	1.76	
	40	16	1.41	1.59	1.83	
	50	16	1.57	1.77	2.04	
	20	14	0.73	1.43	1.65	
IPN-15Q	30	15	0.91	1.56	1.80	
	40	16	1.11	1.67	1.93	
	50	16	1.32	1.98	2.29	

- Square spacing based on 50% diameter of throw
- ▲ Triangle spacing based on 50% diameter of throw

8' Series with 5° Trajectory

Nozzle	Pressure psi	Radius ft.	GPM	Precip. in/h	Precip. 🛦 in/h
IPN-8F	20	7	0.77	1.51	1.75
	30	8	1.04	1.56	1.81
	40	9	1.21	1.43	1.66
	50	9	1.35	1.61	1.86
	20	7	0.38	1.51	1.75
IPN-8F	30	8	0.52	1.56	1.81
	40	9	0.60	1.43	1.66
	50	9	0.68	1.61	1.86
	20	7	0.26	1.54	1.77
IPN-8T	30	8	0.34	1.53	1.77
	40	9	0.41	1.45	1.68
	50	9	0.45	1.62	1.87
	20	7	0.18	1.45	1.67
IPN-80	30	8	0.26	1.56	1.81
	40	9	0.28	1.34	1.55
	50	9	0.31	1.49	1.72

12' Series with 23° Trajectory

Nozzle	Pressure psi	Radius ft.	GPM	Precip. ■ in/h	Precip. ▲ in/h
IPN-12F	20	11	1.74	1.38	1.60
IPIN-12F	30	12	2.28	1.52	1.76
	40	13	2.45	1.39	1.61
	50	13	2.81	1.60	1.85
IDM 12TO	20	11	1.17	1.23	1.42
IPN-12TQ	30	12	1.72	1.53	1.77
	40	13	1.83	1.39	1.60
	50	13	2.00	1.51	1.75
IDM 4 2TT	20	11	1.20	1.43	1.65
IPN-12TT	30	12	1.55	1.55	1.79
4	40	13	1.74	1.49	1.72
	50	13	1.92	1.64	1.90
IDM 1211	20	11	1.00	1.59	1.84
IPN-12H	30	12	1.15	1.54	1.78
	40	13	1.37	1.56	1.80
	50	13	1.64	1.86	2.15
IDNI 4 OT	20	11	0.59	1.42	1.64
IPN-12T	30	12	0.75	1.50	1.74
	40	13	0.91	1.55	1.79
	50	13	1.01	1.73	1.99
IDM 120	20	11	0.46	1.45	1.68
IPN-12Q	30	12	0.57	1.52	1.76
	40	13	0.68	1.56	1.80
	50	13	0.72	1.64	1.89

Specialty Nozzles

9' Series with 20° Trajectory

			,
Nozzle	Pressure psi	W x L ft.	Flow GPM
IPN-9EST	20	3 x 8	0.41
11175251	30	4 x 9	0.45
	40	5 x 10	0.48
IPN-9CST	20	3 x 16	0.85
IF IV-9C31	30	4 x 18	0.90
-	40	5 x 20	0.97
IPN-9SST	20	3 x 16	0.85
11 14-3331	30	4 x 18	0.90
	40	5 x 20	0.97

15' Series with 21° Trajectory

Nozzle	Pressure psi	W x L ft.	Flow GPM
IPN-15EST	20 30	3 x 14	0.52
		4 x 15	0.61
	40	5 x 17	0.70
IPN-15CST	20	3 x 28	1.10
1111-13031	30	4 x 30	1.21
	40	5 x 32	1.35
IPN-15SST	20	3 x 28	1.10
11 14-13331	30	4 x 30	1.21
	40	5 x 32	1.35

ADDED FEATURES

- Stainless steel radius adjustment screw allows for up to 25% in-field reduction
- Five-year warranty

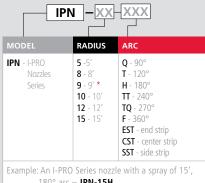
SPECIFICATIONS

- Flow rate: .06-4.75 GPM
- Recommended operating pressure range: 20-50 psi
- Maximum operating pressure range: 75 psi

MODELS

Model	Description
IPN-5F IPN-5H IPN-5T IPN-5Q IPN-8F IPN-8H IPN-8T IPN-8Q IPN-10F IPN-10H IPN-10T IPN-12F IPN-12T IPN-12T IPN-12T IPN-12T IPN-12T IPN-12T IPN-15F IPN-15F IPN-15T IPN-15T IPN-15T IPN-15T IPN-15T	360° Arc 180° Arc 120° Arc 90° Arc 360° Arc 120° Arc 120° Arc 120° Arc 120° Arc 1360° Arc 120° Arc 120° Arc 120° Arc 120° Arc 270° Arc 240° Arc 120° Arc 120° Arc 180° Arc 120° Arc 180° Arc 120° Arc 120° Arc 90° Arc 360° Arc
IPN-9EST IPN-9CST IPN-9SST IPN-15EST IPN-15CST IPN-15SST	End strip, 4' x 9' Center strip, 4' x 18' Side strip, 4' x 18' End strip, 4' x 15' Center strip, 4' x 30' Side strip, 4' x 18'

SPECIFYING INFORMATION



180° arc = **IPN-15H**

Note: 5', 8' and 10' nozzles are not available in TT and TQ arc settings.

^{*} Specialty only







VARIABLE ARC NOZZLES

Featuring an exclusive "Smart Grip" head design that requires no tools, Irritrol® Pro-VAN nozzles provide the industry's easiest 0° to 360° arc adjustment—even when wet—while ensuring precision adjustment for pinpoint coverage. No more dry spots on the lawn. No more wasted water on sidewalks or driveways. Pro-VANs are available in five radii, from 8' to 17', and each allows for up to a 25% radius reduction for even further fine tuning. Plus, because each nozzle is compatible with all Irritrol spray heads, as well as any male-threaded riser in the industry, nozzle inventory can be dramatically reduced. Additional features include a visible left-stop arrow at the top of the nozzle to ensure setting accuracy and color-coding for easy radius identification.

KEY FEATURES & BENEFITS

FULLY ADJUSTABLE ARC - FROM 0° TO 360°

Reduces inventory by meeting the needs of any size or shape landscape

PRECISION ADJUSTMENT

82

Eliminates dry spots on lawns and reduces water waste on sidewalks, etc.

EXCLUSIVE "SMART GRIP" HEAD DESIGN

Requires no tools and provides the industry's easiest arc adjustment – even when wet

COMPATIBLE WITH ANY MALE-THREADED RISER IN THE INDUSTRY

Reduces inventory requirements

VISIBLE LEFT-STOP ARROW ON TOP OF NOZZLE

Ensures setting accuracy

visit us at: www.irritrol.com



PERFORMANCE DATA

8' Series with 5° Trajectory

Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. ■ in/h	Precip. ▲ in/h
2600	20	8	1.72	2.59	2.99
360°	30	8	2.13	3.20	3.70
	40	9	2.48	3.73	4.31
	50	9	2.78	4.18	4.83
2700	20	8	1.36	2.73	3.15
270°	30	9	1.65	3.31	3.82
	40	9	1.89	3.79	4.38
	50	9	2.13	4.27	4.93
	20	9	0.87	2.62	3.02
180°	30	9	1.07	3.22	3.72
	40	9	1.23	3.70	4.27
	50	9	1.38	4.15	4.79
	20	9	0.53	3.19	3.68
90°	30	10	0.64	3.85	4.45
	40	10	0.72	4.33	5.00
	50	10	0.78	4.69	5.42

12' Series with 15° Trajectory

Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. ■ in/h	Precip. 🛦 in/h
2600	20	11	2.26	1.51	1.74
360°	30	12	2.79	1.86	2.15
	40	13	3.20	2.14	2.47
	50	13	3.62	2.42	2.79
2700	20	11	1.85	1.65	1.90
270°	30	12	2.29	2.04	2.36
	40	13	2.64	2.35	2.72
	50	13	2.98	2.66	3.07
	20	11	1.33	1.78	2.05
180°	30	12	1.63	2.18	2.52
	40	13	1.89	2.53	2.92
	50	14	2.12	2.83	3.27
	20	12	0.75	2.01	2.32
90°	30	13	0.93	2.49	2.87
	40	14	1.06	2.83	3.27
	50	14	1.21	3.24	3.74

17' Series with 26° Trajectory

			. ,	·.,	
Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. ■ in/h	Precip. 🛦 in/h
2000	20	14	2.90	0.97	1.12
360°	30	16	3.60	1.20	1.38
	40	17	4.10	1.37	1.58
	50	17	4.60	1.53	1.77
270°	20	14	2.50	1.11	1.28
270°	30	16	3.10	1.38	1.59
	40	17	3.60	1.60	1.85
	50	17	4.00	1.78	2.05
	20	15	1.90	1.27	1.46
180°	30	17	2.40	1.60	1.85
	40	17	2.70	1.80	2.08
	50	18	3.00	2.00	2.31
	20	15	1.20	1.60	1.85
90°	30	17	1.50	2.00	2.31
	40	18	1.70	2.26	2.62
	50	18	1.90	2.53	2.92

10' Series with 10° Trajectory

Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. ■ in/h	Precip. 🛦 in/h
360°	20	10	1.98	1.91	2.20
300	30	10	2.41	2.32	2.68
	40	11	3.19	3.07	3.55
	50	12	3.59	3.46	3.99
270°	20	10	1.60	2.05	2.37
270	30	11	1.95	2.50	2.88
	40	12	2.26	2.89	3.34
	50	12	2.52	3.23	3.73
	20	10	1.13	2.18	2.51
180°	30	11	1.38	2.66	3.07
	40	12	1.58	3.04	3.51
	50	12	1.77	3.41	3.93
	20	11	0.62	2.39	2.76
90°	30	12	0.77	2.96	3.42
	40	12	0.89	3.43	3.96
	50	13	1.00	3.85	4.45

15' Series with 20° Trajectory ●

Nozzle	Pressure psi	Radius ft.	Flow GPM	Precip. ■ in/h	Precip. ▲ in/h
360°	20	14	2.76	1.18	1.36
300	30	15	3.35	1.43	1.65
	40	15	3.87	1.66	1.91
	50	16	4.31	1.84	2.13
270°	20	14	2.36	1.35	1.55
270	30	15	2.89	1.65	1.90
	40	16	3.30	1.88	2.17
	50	16	3.37	2.13	2.46
	20	15	1.70	1.45	1.68
180°	30	16	2.09	1.79	2.06
	40	16	2.42	2.07	2.39
	50	17	2.71	2.32	2.68
	20	15	0.99	1.69	1.96
90°	30	16	1.20	2.05	2.37
	40	17	1.40	2.40	2.77
	50	17	1.56	2.67	3.08

- Square spacing based on 50% diameter of throw
- ▲ Triangle spacing based on 50% diameter of throw



Top-visible arrow quickly indicates left edge of arc setting when adjusted

ADDED FEATURES

- Color-coded for easy radius identification
- Pre-assembled at 0°
- Stainless steel radius adjustment screw allows for up to 25% radius reduction
- Five-year warranty

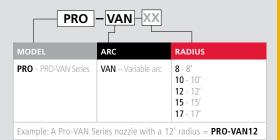
SPECIFICATIONS

- Flow rate: 0.53 4.60 GPM
- Recommended operating pressure range: 20-50 psi
- Maximum operation range: 75 psi

MODELS

<u>Model</u>	Description
PRO-VAN8 PRO-VAN10 PRO-VAN12 PRO-VAN15 PRO-VAN17	8' variable arc pattern 10' variable arc pattern 12' variable arc pattern 15' variable arc pattern 17' variable arc pattern

SPECIFYING INFORMATION



AVAILABLE IN 5 DIFFERENT RADII











call toll free: 800-634-TURF (8873)

•

533 BUBBLER



Designed for localized watering of flower beds, roses, shrub areas and ground covers, Irritrol's 533 Bubbler is the only hand-adjustable flood bubbler that shuts down to a true zero flow.

SPECIFICATIONS

• Recommended working pressure: 20-40 psi

• Flow rate: 1.36-5.90 GPM

• Maximum operation pressure: 75 psi

• Inlet size: 1/2" female NPT threads

• Five-year warranty

DIMENSIONS

• H: 1¹/8"

• Top diameter: 1¹/₁₆"

PERFORMANCE DATA

	90° Adjustment	180° Adjustment	270° Adjustment	360° Adjustment
psi	GPM	GPM	GPM	GPM
15	1.36	2.37	2.85	2.97
20	1.56	2.75	3.31	3.45
25	1.77	3.04	3.71	3.86
30	1.93	3.36	4.05	4.32
35	2.01	3.59	4.37	5.51
40	2.25	3.84	4.70	5.90

KEY FEATURES & BENEFITS

SIMPLE TWIST TOP FLOW ADJUSTMENT

Easily adjusts by hand with no tools needed!

TRUE ZERO FLOW SHUT-OFF

Allows for temporary maintenance needs

FULLY ADJUSTABLE ARC AND FLOW RATE

For flexibility in precise watering needs

HEAVY-DUTY ABS MATERIAL

Provides durability and long-lasting life

AVAILABLE IN LAVENDER

To easily identify non-potable water systems



533 Bubbler



533NP Bubbler





HS100 (SHRUB ADAPTER)

Designed for use with all Irritrol spray head nozzles in shrub and other low traffic areas.



HS100

FEATURES

- Threads directly onto riser
- UV-treated for above-ground mount
- Manufactured of heavy-duty ABS
- Accepts all Irritrol nozzles and any other female-threaded nozzle
- Five-year warranty

SPECIFICATIONS

• Inlet size: 1/2" female NPT threads.

J-PRO-NPC (RECYCLED-WATER CAP)

Purple cap assembly (includes seal) replaces standard spray cap on I-PRO Series to easily identify non-potable water systems.



FEATURES

- Threads onto all I-PRO Series spray head bodies as well as Rain Bird® 1800® Series bodies
- UV-resistant
- Manufactured of heavy-duty ABS material

(I-PRO CHECK VALVE)

For use in I-PRO Series spray heads for protection against low-head drainage. Also reduces water waste and erosion.



FEATURES

- Field-installable
- Holds back up to 10' of elevation change
- One-piece molded plastic
- Manufactured of durable polyolefin material



SUPER BLUE FLEX



BLUE FLEX PIPE

With a strong product heritage and proven years of performance, this tubing is designed to simplify spray head installation making it ideal for challenging landscapes and hard-to-reach areas.



EHF1295-010-D Flex pipe ½" 100' coil

KEY FEATURES & BENEFITS

DURABLE PREMIUM GRADE VIRGIN LINEAR, LOW-DENSITY POLYETHYLENE

Achieves higher psi strength and performance over time vs. competitive products

HIGHLY FLEXIBLE

For ease of use

EASILY UNWINDS FROM CENTER OF COIL

For added convenience

ADDED FEATURES

- Coils are shrink-wrapped for ease of handling
- Low-density design protects tubing from landscape
- Five-year warranty

SPECIFICATIONS

- Maximum working pressure: 120 psi at 100° F
- Inside diameter: .49"
- Outside diameter: .68"
- Wall thickness: .095"
- Nominal size: .50"
- Coil size: 100'



BLUE FLEX ASSEMBLIES



Available in two popular lengths, these sturdy, flexible assemblies protect spray head risers and pipes from breaking when hit or run over by equipment.

KEY FEATURES & BENEFITS

STANDARD 8-INCH LENGTH

Provides greater flexibility and strength than competitors' 6-inch models

PRE-ASSEMBLED

Saves time and money

TAPE-FREE FITTING INSTALLATION

Makes installation faster and easier

FEWER THREADED JOINTS

Minimizes leaks

ADDED FEATURES

- Easily adjusts sprinkler head to required grade
- Compatible for below-grade installation
- Five-year warranty

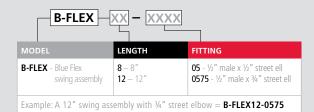
SPECIFICATIONS

- Operating pressure range: 25-75 psi
- Maximum operating pressure: 85 psi
- Pressure-tested to 120 psi

MODELS

Model	<u>Description</u>
B-FLEX8-05	8" x ½" male x ½" street ell
B-FLEX12-05	12" x ½" male x ½" street ell
B-FLEX8-0575	8" x ½" male x ¾" street ell
B-FLEX12-0575	12" x ½" male x ¾" street ell

SPECIFYING INFORMATION



SUPER BLUE FLEX ASSEMBLY FRICTION LOSS DATA

			GP	M FL	OW		
MODELS	1	2	3	4	5	6	7
B-FLEX8-05	0.04	0.11	0.27	0.47	0.85	1.22	1.78
B-FLEX12-05	0.05	0.15	0.36	0.62	1.13	1.62	2.37
B-FLEX8-0575	0.05	0.14	0.31	0.60	1.07	1.65	2.29
B-FLEX12-0575	0.06	0.18	0.41	0.80	1.42	2.20	3.05

BLUE FLEX FITTINGS



Used with Super Blue Flex[™] pipe for installation of spray head risers. Ideal for use in high-traffic areas.

ADDED FEATURES

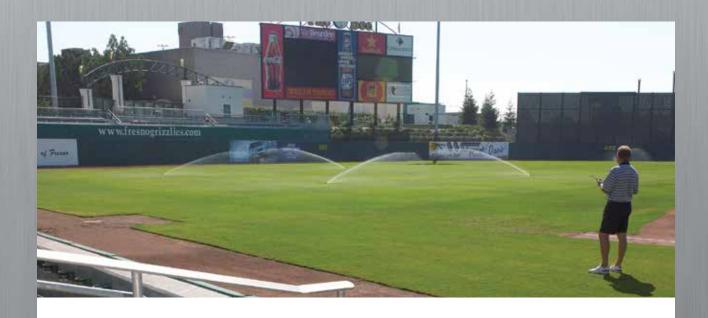
• Five-year warranty

MODELS

Model	Description
• FFP-T	½" barbed tee
• FFP-75EM	¾" male x ½" barb elbow
• FFP-50EM	½" male x ½" barb elbow
• FFP-C	½" barbed coupler

BURES

We are here to help. From friction loss tables to wire sizing, we have all the stats you need to keep working hard.



COMMUNICATIONS DIRECTORY

IRRITROL HEADQUARTERS

Phone: 800-634-TURF (8873)

Fax: 800-862-8676 **Website:** www.irritrol.com

ORDER SERVICES

Phone: 800-883-1234 **Fax:** 800-883-5432

email: orderservices@irritrol.com

CUSTOMER RESOURCE CENTER

At your service to provide literature, promotional and product information, and branch support, as well as answer any questions regarding doing business with Irritrol.

Phone: 800-634-TURF (8873)

Fax: 800-862-8676 email: crc@irritrol.com

TECHNICAL SUPPORT

Phone: 800-634-TURF (8873) **email:** irrigationsupport@irritrol.com

Rain Master® Control Systems: 800-777-1477

CONTROLLER REPAIR

Phone: 800-899-2058

FORMULAS

To Calculate:		U.S.		METRIC
Precipitation Rates				
Equilateral Triangular Spacing	P.R.= (in/hr)	(gpm of 360) x 96.25 (Head spacing) ² x .866	P.R= (mm/hr)	m ³ /hr of 360 x 1000 m ² x .866
Square/Rectangular Spacing	P.R.= (in/hr)	(gpm of 360) x 96.25 Head spacing x row spacing	P.R= (mm/hr)	m³/hr of 360 x 1000 Head spacing x row spacing
Square/Rectangular Spacing for Specific Arc	P.R.= (in/hr)	(34650 x gpm (for any arc) Degrees of arc x head spacing x row spacing	P.R= (mm/hr)	m³/hr (for any arc) x 1000 Degrees of arc x head spacing x row spacing
Horsepower				
	H.P.=	gpm x ft. of Head 3,900 x pump efficiency (expressed as a decimal)		
Station Run Time				
	S.R.T.= (min/wk)	Total weekly req'd (inch/wk) x 60 (min/hr) Precipitation rate (in/hr)	S.R.T.= (min/wk)	Total weekly req'd (inch/wk) x 60 (min/hr) Precipitation rate (mm/hr)
Pipe Velocity				
	V= (ft/sec)	0.4085 x Flow (GPM) (Inside pipe diameter in inches) ²	V= (m/sec)	1273.24 x Flow (l/sec) (Inside pipe diameter in millimeters) ²
Scheduling Coefficient	I			
	S.C.=	Average precipitation rate (in/hr) Lowest precipitation rate (in/hr)	S.C.=	Average precipitation rate (mm/hr) Lowest precipitation rate (mm/hr)
Slope				
	S =	Rise (measure of length) Run (measure of length)		

SPRINKLER SPACING AND PRECIPITATION RATE FORMULAS

Square-spaced sprinklers in pattern:

GPM of full circle x 96.3

(spacing)²



Square Spacing

- No wind 55% of diameter
- 4 mph wind 50% of diameter
- 8 mph wind 45% of diameter

Triangular-spaced sprinklers in pattern:

GPM of full circle x 96.3

(spacing)² (0.866)

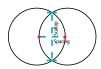


Triangular Spacing

- No wind 50% of diameter
- 4 mph wind 55% of diameter
- 8 mph wind 50% of diameter

Single row:

GPM of full circle x 96.3 (spacing) (scallop)



Single-Row Spacing

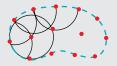
- No wind 50% of diameter
- 4 mph wind 50% of diameter
- 8 mph wind 45% of diameter

Area and flow:

90

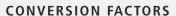
Total GPM of zone x 96.3

Total irrigated square feet of zone



Irritrol does not recommend designing for 0 mph wind conditions. Design in consideration of the worst wind conditions.





To Convert:	From	То	Multiply by
	acres	feet ²	43,560
	acres	meters ²	4046.8
	meters ²	feet²	10.764
AREA	feet ²	inches²	144
	inches ²	centimeters ²	6.452
	hectares	meters ²	10,000
	hectares	acres	2.471
POWER	kilowatts	horsepower	1.3410
	feet³/minute	meters³/second	0.0004719
	feet³/second	meters³/second	.02832
	yards³/minute	meters³/second	.01274
	gallons/minute	meters³/hour	.22716
FLOW	gallons/minute	liters/minutes	3.7854
	gallons/minute	liters/second	.06309
	meters³/hour	liters/minute	16.645
	meters³/hour	liters/second	.2774
	liters/minute	liters/second	60
	feet	inches	12
	inches	centimeters	2.540
	feet	meters	.30481
LENGTH	kilometers	miles	.6214
	miles	feet	5,280
	miles	meters	1609.34
	millimeters	inch	.03937
	psi	kilopascals	6.89476
	psi	bars	.068948
PRESSURE	Bars	kilopascals	100
	psi	feet of head	2.31
VELOCITY	feet/second	meters/second	.3048
	feet³	gallons	7.481
	feet³	liters	28.32
	meters ³	feet³	35.31
	meters ³	yard³	1.3087
VOLUME	yards ³	feet³	27
VOLUME	yards³	gallons	202
	acres/feet	feet³	43,560
	gallons	meters ³	.003785
	gallons	liters	3.785
	imperial gallons	gallons	1.833

FRICTION LOSS FORMULAS

Friction Loss Tables are based upon the following:

Hazen-Williams Equation:

 $H_f = (0.2083) (100 / C)^{1.852} (Q^{1.852} / D^{4.866})$

(The result is multiplied by .433 to give psi loss for 100 feet of pipe)

The velocity values were derived using the following:

$$V = (0.408 \times Q_{gpm}) / d^2$$

(The average inside diameter of OD controlled pipe was based upon subtracting two times the minimum wall thickness plus one-half of the wall thickness tolerance from the outside diameter.)

- Pressure ratings for plastic pipes are based on 23° C or 73.4° F
- Head loss decreases (increases) approximately 1% for every 3 degrees F above (below) the reference temperature (73.4° F)



PVC CLASS 200 IPS PLASTIC PIPE

Size: ½" thru 6" Flow: 1 thru 500GPM

ASTM D-2241 (1120, 1220) SDR 21 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

Avg IID	2" 2½" 3" 4"	2" 21/2"	1 ½ "	1 1/4 "	1"	3/4 "	1/2 "	size
Column C	2.129 2.581 3.146 4.046 2.375 2.875 3.500 4.500 0.123 0.147 0.177 0.227	2.129 2.581 2.375 2.875 0.123 0.147	1.700 1.900 0.100	1.482 1.660 0.089	1.169 1.315 0.073	0.910 1.050 0.070	0.696 0.840 0.072	Avg.ID Pipe OD Avg Wall
2				· · · · · · · · · · · · · · · · · · ·				
7 5.90 9.12 3.45 2.47 2.09 0.73 1.30 0.23 0.99 0.12 0.63 0.04 0.43 0.02 0.29 0.01 9 7.58 14.53 3.94 3.17 2.39 0.94 1.49 0.30 1.13 0.15 0.72 0.81 0.06 0.55 0.02 0.37 0.01 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.27	0.27 0.01 0.36 0.01 0.24 0.01 0.45 0.02 0.31 0.01	0.28 0.01 0.42 0.02 0.56 0.04 0.71 0.06	0.37 0.02 0.56 0.05 0.74 0.08 0.93 0.12	0.60 0.07 0.90 0.15 1.19 0.26 1.49 0.39	0.99 0.24 1.48 0.52 1.97 0.88 2.46 1.33	1.68 0.90 2.53 1.90 3.37 3.24 4.21 4.89	2 1 3 2 4 3 5 4
14	0.63 0.04 0.43 0.02 0.29 0.01 0.72 0.05 0.49 0.02 0.33 0.01 0.81 0.06 0.55 0.02 0.37 0.01	0.63 0.04 0.43 0.02 0.72 0.05 0.49 0.02 0.81 0.06 0.55 0.02	0.99 0.12 1.13 0.15 1.27 0.19	1.30 0.23 1.49 0.30 1.67 0.37	2.09 0.73 2.39 0.94 2.69 1.17	3.45 2.47 3.94 3.17 4.43 3.94	5.90 9.12 6.74 11.68 7.58 14.53	7 5 8 6 9 7
24	1.26 0.14 0.86 0.06 0.58 0.02 1.44 0.18 0.98 0.07 0.66 0.03 0.40 0.01 1.62 0.23 1.10 0.09 0.74 0.03 0.45 0.01	1.26 0.14 0.86 0.06 1.44 0.18 0.98 0.07 1.62 0.23 1.10 0.09	1.98 0.43 2.26 0.55 2.54 0.68	2.60 0.83 2.97 1.07 3.34 1.33	4.18 2.64 4.78 3.38 5.37 4.21	6.90 8.93 7.88 11.44 8.87 14.23	11.79 32.93 13.48 42.16	14 11 16 13 18 15
34	2.16 0.39 1.47 0.15 0.99 0.06 0.60 0.02 2.34 0.45 1.59 0.18 1.07 0.07 0.65 0.02 2.52 0.52 1.71 0.20 1.15 0.08 0.70 0.02	2.16 0.39 1.47 0.15 2.34 0.45 1.59 0.18 2.52 0.52 1.71 0.20	3.39 1.16 3.67 1.34 3.95 1.54	4.46 2.26 4.83 2.62 5.20 3.01	7.17 7.17 7.76 8.31 8.36 9.53	11.82 24.24 12.81 28.11 13.80 32.25		24 26 28
13.14 22.02 8.17 6.94 6.21 3.56 3.96 1.19 2.69 0.47 1.81 0.18 1.10 0.05 13.73 23.91 8.55 7.54 6.49 3.86 4.14 1.29 2.82 0.51 1.90 0.19 1.15 0.06 14.33 25.87 8.92 8.15 6.78 4.18 4.32 1.40 2.94 0.55 1.98 0.21 1.20 0.06 14.93 27.90 9.29 8.79 7.06 4.51 4.50 1.51 3.06 0.59 2.06 0.23 1.25 0.07 55	3.06	3.06 0.74 2.08 0.29 3.24 0.82 2.20 0.32 3.42 0.91 2.33 0.36	4.80 2.21 5.08 2.45 5.36 2.71	6.32 4.31 6.69 4.79 7.06 5.29	10.15 13.66 10.75 15.18 11.35 16.78			34 36 38
11.15 12.33 8.47 6.32 5.40 2.11 3.67 0.83 2.47 0.32 1.50 0.09	3.96 1.19 2.69 0.47 1.81 0.18 1.10 0.05 4.14 1.29 2.82 0.51 1.90 0.19 1.15 0.06 4.32 1.40 2.94 0.55 1.98 0.21 1.20 0.06	3.96	6.21 3.56 6.49 3.86 6.78 4.18	8.17 6.94 8.55 7.54 8.92 8.15	13.14 22.02 13.73 23.91 14.33 25.87			44 46 48
85 12.00 12.05 7.65 4.03 5.21 1.58 3.50 0.60 2.12 0.18 90 12.71 13.40 8.10 4.48 5.51 1.76 3.71 0.67 2.24 0.20 13.41 14.81 8.55 4.95 5.82 1.94 3.92 0.74 2.37 0.22 1100 110 9.90 6.50 6.74 2.55 4.53 0.97 2.74 0.29 120 10.80 7.63 7.35 2.99 4.95 1.14 2.99 0.34 130 11.70 8.85 7.96 3.47 5.36 1.32 3.24 0.39 1400 12.60 10.16 8.57 3.98 5.77 1.52 3.49 0.45 150 13.50 11.54 9.19 4.52 6.18 1.73 3.74 0.51 160 10.41 5.70 7.01 2.18 4.24 0.64 180 11.02 6.34 7.42 2.42 4.49 0.71 190 11.64 7.01 7.83 2.67 4.74 0.79	5.40 2.11 3.67 0.83 2.47 0.32 1.50 0.09 5.85 2.45 3.98 0.96 2.68 0.37 1.62 0.11 6.30 2.81 4.29 1.10 2.89 0.42 1.74 0.12	5.40 2.11 3.67 0.83 5.85 2.45 3.98 0.96 6.30 2.81 4.29 1.10	8.47 6.32 9.18 7.33 9.88 8.41	11.15 12.33 12.07 14.30 13.00 16.40				60 65 70
120	7.65 4.03 5.21 1.58 3.50 0.60 2.12 0.18 8.10 4.48 5.51 1.76 3.71 0.67 2.24 0.20 8.55 4.95 5.82 1.94 3.92 0.74 2.37 0.22	7.65 4.03 5.21 1.58 8.10 4.48 5.51 1.76 8.55 4.95 5.82 1.94	12.00 12.05 12.71 13.40 13.41 14.81	14.86 21.00				85 90 95
170 180 190 11.02 1.634 1.02 1.634 1.02 1.634 1.02 1.634 1.02 1.634 1.02 1.634 1.64 1.64 1.64 1.64 1.64 1.64 1.64 1.6	0.80 7.63 7.35 2.99 4.95 1.14 2.99 0.34 1.70 8.85 7.96 3.47 5.36 1.32 3.24 0.39 2.60 10.16 8.57 3.98 5.77 1.52 3.49 0.45	10.80 7.63 7.35 2.99 11.70 8.85 7.96 3.47 12.60 10.16 8.57 3.98						120 130 140 150
12.23 7.71 6.24 2.94 4.98 0.80	10.41 5.70 7.01 2.18 4.24 0.64 11.02 6.34 7.42 2.42 4.49 0.71	10.41 5.70 11.02 6.34 11.64 7.01						170 180
220 240 260 280 300	14.70 10.80 9.89 4.12 5.98 1.21 10.72 4.78 6.48 1.41 11.54 5.48 6.98 1.61							240 260 280 300
320 340 360 380 400 Shaded area represents velocities over 5 fps. Use with caution. 13.19 14.02 7.86 8.47 2.31 14.84 8.73 8.97 2.57 9.47 2.84 9.97 3.12	14.02 7.86 8.47 2.31 14.84 8.73 8.97 2.57 9.47 2.84 9.97 3.12			5 fps.		•	Shade	340 360 380 400
420 440 440 480 500	10.97 3.72 11.46 4.04 11.96 4.37							440 460 480





PVC CLASS 315 IPS PLASTIC PIPE

Size: ½" thru 6" Flow: 1 thru 500GPM

ASTM D-2239 (1120, 1220) SDR 13.5 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	1/2	2"	3/4	."	1	11	11	/ ₄ "	11	/2 "	2	"	21	/ ₂ "	3	"	4	,"	6	"
Avg.ID	0.6	96	0.8	374	1.1			394	1.5	98	1.9		2.4	23	2.9	948	3.7	794	5.5	83
Pipe OD		340	1.0		1.3			60		000	2.3			75		00		500		25
Avg Wall Min Wall)72	0.0		0.1			133		151	0.1			26	0.2		0.3			21
		062	0.0		0.0			23	0.1		0.1			13		259		333		191
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1 2 3 4 5	0.84 1.68 2.53 3.37 4.21	0.25 0.90 1.90 3.24 4.89	0.53 1.07 1.60 2.14 2.67	0.08 0.30 0.63 1.07 1.61	0.34 0.67 1.01 1.35 1.68	0.03 0.10 0.20 0.35 0.53	0.21 0.42 0.63 0.84 1.05	0.01 0.03 0.06 0.11 0.17	0.16 0.32 0.48 0.64 0.80	0.00 0.02 0.03 0.06 0.09	0.21 0.31 0.42 0.52	0.01 0.01 0.02 0.03	0.28 0.35	0.01 0.01						
6 7 8 9 10	5.05 5.90 6.74 7.58 8.42	6.86 9.12 11.68 14.53 17.66	3.20 3.74 4.27 4.81 5.34	2.26 3.01 3.86 4.80 5.83	2.02 2.36 2.69 3.03 3.37	0.74 0.98 1.25 1.56 1.90	1.26 1.47 1.68 1.89 2.10	0.23 0.31 0.40 0.49 0.60	0.96 1.12 1.28 1.44 1.60	0.12 0.16 0.20 0.25 0.31	0.62 0.73 0.83 0.93 1.04	0.04 0.06 0.07 0.09 0.11	0.42 0.49 0.56 0.63 0.69	0.02 0.02 0.03 0.03 0.04	0.28 0.33 0.38 0.42 0.47	0.01 0.01 0.01 0.01 0.02				
12 14 16 18 20	10.11 11.79 13.48 15.16	24.75 32.93 42.16 52.44	6.41 7.48 8.55 9.61 10.68	8.17 10.87 13.92 17.32 21.05	4.04 4.71 5.39 6.06 6.73	2.66 3.53 4.53 5.63 6.84	2.52 2.94 3.36 3.78 4.20	0.84 1.12 1.44 1.79 2.17	1.92 2.24 2.56 2.88 3.20	0.43 0.58 0.74 0.92 1.12	1.25 1.45 1.66 1.87 2.08	0.15 0.20 0.26 0.32 0.39	0.83 0.97 1.11 1.25 1.39	0.06 0.08 0.10 0.12 0.15	0.56 0.66 0.75 0.85 0.94	0.02 0.03 0.04 0.05 0.06	0.45 0.51 0.57	0.01 0.01 0.02		
22 24 26 28 30			11.75 12.82 13.89 14.96 16.02	25.11 29.50 34.21 39.25 44.60	7.40 8.08 8.75 9.42 10.10	8.16 9.59 11.12 12.76 14.50	4.62 5.04 5.46 5.88 6.30	2.59 3.04 3.53 4.05 4.60	3.52 3.83 4.15 4.47 4.79	1.33 1.57 1.82 2.08 2.37	2.28 2.49 2.70 2.91 3.11	0.47 0.55 0.64 0.73 0.83	1.53 1.67 1.81 1.95 2.08	0.18 0.21 0.24 0.27 0.31	1.03 1.13 1.22 1.31 1.41	0.07 0.08 0.09 0.11 0.12	0.62 0.68 0.74 0.79 0.85	0.02 0.02 0.03 0.03 0.04		
32 34 36 38 40					10.77 11.44 12.12 12.79 13.46	16.34 18.28 20.32 22.46 24.70	6.72 7.14 7.56 7.98 8.40	5.18 5.80 6.45 7.13 7.84	5.11 5.43 5.75 6.07 6.39	2.67 2.98 3.32 3.67 4.03	3.32 3.53 3.74 3.94 4.15	0.93 1.04 1.16 1.28 1.41	2.22 2.36 2.50 2.64 2.78	0.35 0.39 0.44 0.48 0.53	1.50 1.60 1.69 1.78 1.88	0.14 0.15 0.17 0.19 0.20	0.91 0.96 1.02 1.08 1.13	0.04 0.04 0.05 0.05 0.06	0.42 0.45 0.47 0.50 0.52	0.01 0.01 0.01 0.01 0.01
42 44 46 48 50					14.14 14.81 15.48 16.16 16.83	27.04 29.47 32.00 34.62 37.34	8.82 9.24 9.66 10.08 10.50	8.58 9.35 10.15 10.98 11.85	6.71 7.03 7.35 7.67 7.99	4.41 4.81 5.22 5.65 6.09	4.36 4.57 4.77 4.98 5.19	1.54 1.68 1.83 1.98 2.13	2.92 3.06 3.20 3.34 3.47	0.58 0.63 0.69 0.75 0.80	1.97 2.07 2.16 2.25 2.35	0.22 0.24 0.27 0.29 0.31	1.19 1.25 1.30 1.36 1.42	0.07 0.07 0.08 0.08 0.09	0.55 0.58 0.60 0.63 0.65	0.01 0.01 0.01 0.01 0.01
55 60 65 70 75							11.55 12.60 13.65 14.70 15.75	14.13 16.60 19.26 22.09 25.10	8.79 9.59 10.39 11.18 11.98	7.27 8.54 9.91 11.37 12.91	5.71 6.23 6.74 7.26 7.78	2.54 2.99 3.47 3.98 4.52	3.82 4.17 4.52 4.86 5.21	0.96 1.13 1.31 1.50 1.70	2.58 2.82 3.05 3.29 3.52	0.37 0.43 0.50 0.58 0.66	1.56 1.70 1.84 1.98 2.13	0.11 0.13 0.15 0.17 0.19	0.72 0.79 0.85 0.92 0.98	0.02 0.02 0.02 0.03 0.03
80 85 90 95 100							16.80	28.29	12.78 13.58 14.38 15.18 15.98	14.55 16.28 18.10 20.01 22.00	8.30 8.82 9.34 9.86 10.38	5.09 5.70 6.33 7.00 7.70	5.56 5.91 6.25 6.60 6.95	1.92 2.15 2.39 2.64 2.90	3.76 3.99 4.23 4.46 4.69	0.74 0.83 0.92 1.02 1.12	2.27 2.41 2.55 2.69 2.83	0.22 0.24 0.27 0.30 0.33	1.05 1.11 1.18 1.24 1.31	0.03 0.04 0.04 0.05 0.05
110 120 130 140 150											11.41 12.45 13.49 14.53 15.56	9.18 10.79 12.51 14.35 16.31	7.64 8.34 9.03 9.73 10.42	3.46 4.07 4.72 5.41 6.15	5.16 5.63 6.10 6.57 7.04	1.33 1.57 1.82 2.08 2.37	3.12 3.40 3.68 3.97 4.25	0.39 0.46 0.53 0.61 0.69	1.44 1.57 1.70 1.83 1.96	0.06 0.07 0.08 0.09 0.11
160 170 180 190 200											16.60	18.38	11.12 11.81 12.51 13.20 13.90	6.93 7.76 8.62 9.53 10.48	7.51 7.98 8.45 8.92 9.39	2.67 2.99 3.32 3.67 4.03	4.54 4.82 5.10 5.39 5.67	0.78 0.87 0.97 1.08 1.18	2.09 2.23 2.36 2.49 2.62	0.12 0.13 0.15 0.16 0.18
220 240 260 280 300													15.29 16.68	12.50 14.69	10.33 11.27 12.21 13.15 14.08	4.81 5.66 6.56 7.52 8.55	6.24 6.80 7.37 7.94 8.50	1.41 1.66 1.92 2.20 2.50	2.88 3.14 3.40 3.67 3.93	0.22 0.25 0.29 0.34 0.38
320 340 360 380 400		Shade	d area re	•	ts velocit caution		5 fps.								15.02 15.96 16.90	9.64 10.78 11.98	9.07 9.64 10.20 10.77 11.34	2.82 3.16 3.51 3.88 4.27	4.19 4.45 4.71 4.97 5.24	0.43 0.48 0.54 0.59 0.65
420 440 460 480 500																	11.90 12.47 13.04 13.61 14.17	4.67 5.09 5.53 5.98 6.45	5.50 5.76 6.02 6.28 6.54	0.71 0.78 0.84 0.91 0.98



SCHEDULE 40 PVC IPS PLASTIC PIPE

Size: ½" thru 6" **Flow:** 1 thru 500GPM
ASTM D-1785 (1120, 1220) C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	1/2	2"	3/2	, "	1	"	11	/4 <i>"</i>	11	/2 "	2	."	21	/2 "	3	"	4	."	6	5"
Avg.ID	0.6	502	0.8	304	1.0	029	1.3	360	1.5	590	2.0	047	2.4	145	3.0	042	3.9	998	6.0	031
Pipe OD		340)50		315		560		900		375		375		500		500		625
Avg Wall Min Wall		I 19 I 09		123 113		143 133		150 140		155 145		164 154		215 203		229 216		251 237		297 280
Flow	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI
GPM	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss
1 2 3 4 5	1.13 2.25 3.38 4.50 5.63	0.50 1.82 3.85 6.55 9.91	0.63 1.26 1.89 2.52 3.16	0.12 0.44 0.94 1.60 2.42	0.39 0.77 1.16 1.54 1.93	0.04 0.13 0.28 0.48 0.73	0.22 0.44 0.66 0.88 1.10	0.01 0.03 0.07 0.12 0.19	0.16 0.32 0.48 0.65 0.81	0.00 0.02 0.03 0.06 0.09	0.19 0.29 0.39 0.49	0.00 0.01 0.02 0.03	0.27 0.34	0.01 0.01						
6 7 8 9 10	6.75 7.88 9.01 10.13 11.26	13.89 18.48 23.66 29.43 35.77	3.79 4.42 5.05 5.68 6.31	3.40 4.52 5.79 7.20 8.75	2.31 2.70 3.08 3.47 3.85	1.02 1.36 1.74 2.17 2.63	1.32 1.54 1.76 1.99 2.21	0.26 0.35 0.45 0.56 0.68	0.97 1.13 1.29 1.45 1.61	0.12 0.16 0.21 0.26 0.32	0.58 0.68 0.78 0.88 0.97	0.04 0.05 0.06 0.08 0.09	0.41 0.48 0.55 0.61 0.68	0.02 0.02 0.03 0.03 0.04	0.26 0.31 0.35 0.40 0.44	0.01 0.01 0.01 0.01 0.01				
12 14 16 18 20	13.51 15.76 18.01 20.26	50.14 66.71 85.42 106.24	7.57 8.84 10.10 11.36 12.62	12.27 16.32 20.90 25.99 31.59	4.62 5.39 6.17 6.94 7.71	3.69 4.91 6.29 7.82 9.51	2.65 3.09 3.53 3.97 4.41	0.95 1.26 1.62 2.01 2.45	1.94 2.26 2.58 2.90 3.23	0.44 0.59 0.76 0.94 1.14	1.17 1.36 1.56 1.75 1.95	0.13 0.17 0.22 0.28 0.33	0.82 0.96 1.09 1.23 1.36	0.05 0.07 0.09 0.12 0.14	0.53 0.62 0.71 0.79 0.88	0.02 0.03 0.03 0.04 0.05	0.41 0.46 0.51	0.01 0.01 0.01		
22 24 26 28 30			13.89 15.15 16.41 17.67 18.94	37.69 44.28 51.36 58.91 66.94	8.48 9.25 10.02 10.79 11.56	11.35 13.33 15.46 17.73 20.15	4.85 5.29 5.74 6.18 6.62	2.92 3.43 3.98 4.56 5.19	3.55 3.87 4.20 4.52 4.84	1.37 1.60 1.86 2.13 2.42	2.14 2.34 2.53 2.73 2.92	0.40 0.47 0.54 0.62 0.71	1.50 1.64 1.77 1.91 2.05	0.17 0.20 0.23 0.26 0.30	0.97 1.06 1.15 1.23 1.32	0.06 0.07 0.08 0.09 0.10	0.56 0.61 0.66 0.71 0.77	0.02 0.02 0.02 0.02 0.03		
32 34 36 38 40					12.33 13.10 13.87 14.64 15.41	22.71 25.41 28.24 31.22 34.33	7.06 7.50 7.94 8.38 8.82	5.85 6.54 7.27 8.04 8.84	5.16 5.49 5.81 6.13 6.46	2.73 3.06 3.40 3.76 4.13	3.12 3.31 3.51 3.70 3.89	0.80 0.89 0.99 1.10 1.21	2.18 2.32 2.46 2.59 2.73	0.34 0.38 0.42 0.46 0.51	1.41 1.50 1.59 1.68 1.76	0.12 0.13 0.14 0.16 0.18	0.82 0.87 0.92 0.97 1.02	0.03 0.03 0.04 0.04 0.05	0.36 0.38 0.40 0.43 0.45	0.00 0.00 0.01 0.01 0.01
42 44 46 48 50					16.18 16.95 17.73 18.50 19.27	37.58 40.96 44.47 48.12 51.90	9.26 9.71 10.15 10.59 11.03	9.67 10.54 11.45 12.39 13.36	6.78 7.10 7.42 7.75 8.07	4.52 4.93 5.35 5.79 6.25	4.09 4.28 4.48 4.67 4.87	1.32 1.44 1.57 1.69 1.83	2.87 3.00 3.14 3.28 3.41	0.56 0.61 0.66 0.71 0.77	1.85 1.94 2.03 2.12 2.20	0.19 0.21 0.23 0.25 0.27	1.07 1.12 1.17 1.23 1.28	0.05 0.06 0.06 0.07 0.07	0.47 0.49 0.52 0.54 0.56	0.01 0.01 0.01 0.01 0.01
55 60 65 70 75							12.13 13.24 14.34 15.44 16.54	15.94 18.72 21.72 24.91 28.31	8.88 9.68 10.49 11.30 12.10	7.45 8.75 10.15 11.65 13.23	5.36 5.84 6.33 6.82 7.30	2.18 2.56 2.97 3.41 3.87	3.75 4.09 4.44 4.78 5.12	0.92 1.08 1.25 1.43 1.63	2.42 2.65 2.87 3.09 3.31	0.32 0.37 0.43 0.50 0.56	1.40 1.53 1.66 1.79 1.91	0.08 0.10 0.11 0.13 0.15	0.62 0.67 0.73 0.79 0.84	0.01 0.01 0.02 0.02 0.02
80 85 90 95 100							17.65	31.90	12.91 13.72 14.52 15.33 16.14	14.91 16.69 18.55 20.50 22.55	7.79 8.28 8.76 9.25 9.74	4.36 4.88 5.43 6.00 6.59	5.46 5.80 6.14 6.48 6.82	1.84 2.06 2.29 2.53 2.78	3.53 3.75 3.97 4.19 4.41	0.63 0.71 0.79 0.87 0.96	2.04 2.17 2.30 2.42 2.55	0.17 0.19 0.21 0.23 0.25	0.90 0.95 1.01 1.07 1.12	0.02 0.03 0.03 0.03 0.03
110 120 130 140 150											10.71 11.68 12.66 13.63 14.61	7.87 9.24 10.72 12.30 13.97	7.51 8.19 8.87 9.55 10.24	3.31 3.89 4.52 5.18 5.89	4.85 5.29 5.73 6.17 6.61	1.14 1.34 1.56 1.79 2.03	2.81 3.06 3.32 3.57 3.83	0.30 0.36 0.41 0.47 0.54	1.23 1.35 1.46 1.57 1.68	0.04 0.05 0.06 0.06 0.07
160 170 180 190 200											15.58	15.75	10.92 11.60 12.28 12.97 13.65	6.63 7.42 8.25 9.12 10.03	7.05 7.50 7.94 8.38 8.82	2.29 2.56 2.85 3.15 3.46	4.08 4.34 4.59 4.85 5.11	0.61 0.68 0.75 0.83 0.92	1.79 1.91 2.02 2.13 2.24	0.08 0.09 0.10 0.11 0.12
220 240 260 280 300													15.01 16.38	11.96 14.06	9.70 10.58 11.46 12.35 13.23	4.13 4.85 5.63 6.46 7.34	5.62 6.13 6.64 7.15 7.66	1.09 1.28 1.49 1.71 1.94	2.47 2.69 2.92 3.14 3.37	0.15 0.17 0.20 0.23 0.26
320 340 360 380 400		Shaded area represents ve Use with cau					r 5 fps.								14.11 14.99 15.87	8.27 9.25 10.29	8.17 8.68 9.19 9.70 10.21	2.19 2.45 2.72 3.01 3.31	3.59 3.81 4.04 4.26 4.49	0.30 0.33 0.37 0.41 0.45
420 440 460 480 500																	10.72 11.23 11.74 12.25 12.76	3.62 3.95 4.28 4.64 5.00	4.71 4.94 5.16 5.38 5.61	0.49 0.53 0.58 0.63 0.68





SCHEDULE 80 PVC IPS PLASTIC PIPE

Size: ½" thru 6" Flow: 1 thru 500GPM

ASTM D-1785 (1120, 1220) C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

				IVI D-			20, 1		C-13					LLIO						
size	1/2	2"	3/2	ı "	1	"	11	/4 "	11	/2 "	2		21	/2 "	3	"	4	"	6	"
Avg.ID		26		722	l	35		254		76		13		89		64		86		709
Pipe OD		340		050	l	315		60		00		375		375		00		00		525
Avg Wall Min Wall	0.1			164		190		203		212		231		93		18		57		158
IVIIII VVAII	0.1	147	0.1	154	0.1	179	0.1	91	0.2	200	0.2	218	0.2	76	0.3	00	0.3	37	0.4	132
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1 2 3 4 5	1.47 2.95 4.42 5.90 7.37	0.97 3.50 7.42 12.64 19.11	0.78 1.57 2.35 3.13 3.91	0.21 0.75 1.59 2.71 4.09	0.47 0.93 1.40 1.87 2.33	0.06 0.21 0.45 0.77 1.16	0.26 0.52 0.78 1.04 1.30	0.01 0.05 0.11 0.18 0.28	0.19 0.37 0.56 0.75 0.94	0.01 0.02 0.05 0.08 0.13	0.22 0.33 0.45 0.56	0.01 0.01 0.02 0.04	0.31 0.39	0.01 0.01						
6 7 8 9 10	8.85 10.32 11.80 13.27 14.75	26.78 35.63 45.63 56.75 68.98	4.70 5.48 6.26 7.04 7.83	5.74 7.63 9.77 12.15 14.77	2.80 3.27 3.73 4.20 4.67	1.63 2.17 2.78 3.45 4.20	1.56 1.82 2.08 2.34 2.59	0.39 0.52 0.67 0.83 1.01	1.12 1.31 1.50 1.69 1.87	0.18 0.24 0.30 0.37 0.46	0.67 0.78 0.89 1.00 1.11	0.05 0.07 0.09 0.11 0.13	0.47 0.55 0.62 0.70 0.78	0.02 0.03 0.04 0.04 0.05	0.30 0.35 0.40 0.45 0.50	0.01 0.01 0.01 0.01 0.02				
12 14 16 18 20			9.39 10.96 12.52 14.09 15.65	20.70 27.55 35.27 43.87 53.32	5.60 6.53 7.47 8.40 9.33	5.88 7.83 10.03 12.47 15.16	3.11 3.63 4.15 4.67 5.19	1.41 1.88 2.40 2.99 3.63	2.25 2.62 3.00 3.37 3.75	0.64 0.85 1.09 1.35 1.64	1.34 1.56 1.78 2.01 2.23	0.18 0.24 0.31 0.38 0.47	0.93 1.09 1.25 1.40 1.56	0.08 0.10 0.13 0.16 0.19	0.60 0.70 0.80 0.90 0.99	0.03 0.03 0.04 0.05 0.07	0.46 0.51 0.57	0.01 0.01 0.02		
22 24 26 28 30					10.27 11.20 12.13 13.07 14.00	18.08 21.24 24.64 28.26 32.12	5.71 6.23 6.75 7.26 7.78	4.33 5.09 5.91 6.77 7.70	4.12 4.49 4.87 5.24 5.62	1.96 2.30 2.67 3.06 3.48	2.45 2.68 2.90 3.12 3.34	0.56 0.65 0.76 0.87 0.99	1.71 1.87 2.02 2.18 2.34	0.23 0.27 0.32 0.36 0.41	1.09 1.19 1.29 1.39 1.49	0.08 0.09 0.11 0.12 0.14	0.63 0.68 0.74 0.80 0.85	0.02 0.02 0.03 0.03 0.04		
32 34 36 38 40					14.93 15.87	36.19 40.49	8.30 8.82 9.34 9.86 10.38	8.68 9.71 10.79 11.93 13.11	5.99 6.37 6.74 7.12 7.49	3.92 4.39 4.88 5.40 5.93	3.57 3.79 4.01 4.24 4.46	1.11 1.24 1.38 1.53 1.68	2.49 2.65 2.80 2.96 3.11	0.46 0.52 0.58 0.64 0.70	1.59 1.69 1.79 1.89 1.99	0.16 0.17 0.19 0.21 0.24	0.91 0.97 1.02 1.08 1.14	0.04 0.04 0.05 0.06 0.06	0.40 0.43 0.45 0.48 0.50	0.01 0.01 0.01 0.01 0.01
42 44 46 48 50							10.90 11.42 11.94 12.45 12.97	14.35 15.65 16.99 18.38 19.83	7.87 8.24 8.61 8.99 9.36	6.49 7.08 7.69 8.32 8.97	4.68 4.91 5.13 5.35 5.57	1.84 2.00 2.18 2.35 2.54	3.27 3.43 3.58 3.74 3.89	0.77 0.84 0.91 0.98 1.06	2.09 2.19 2.29 2.39 2.49	0.26 0.28 0.31 0.33 0.36	1.20 1.25 1.31 1.37 1.42	0.07 0.07 0.08 0.08 0.09	0.53 0.55 0.58 0.60 0.63	0.01 0.01 0.01 0.01 0.01
55 60 65 70 75							14.27 15.57	23.65 27.79	10.30 11.24 12.17 13.11 14.05	10.70 12.57 14.58 16.73 19.01	6.13 6.69 7.25 7.80 8.36	3.03 3.56 4.13 4.74 5.38	4.28 4.67 5.06 5.45 5.84	1.27 1.49 1.72 1.98 2.25	2.74 2.98 3.23 3.48 3.73	0.43 0.50 0.58 0.66 0.76	1.57 1.71 1.85 1.99 2.13	0.11 0.13 0.15 0.17 0.19	0.69 0.75 0.81 0.88 0.94	0.01 0.02 0.02 0.02 0.03
80 85 90 95 100									14.98 15.92	21.42 23.96	8.92 9.48 10.03 10.59 11.15	6.06 6.78 7.54 8.34 9.17	6.23 6.62 7.01 7.40 7.79	2.53 2.83 3.15 3.48 3.83	3.98 4.23 4.48 4.73 4.97	0.85 0.95 1.06 1.17 1.29	2.28 2.42 2.56 2.70 2.85	0.22 0.24 0.27 0.30 0.33	1.00 1.06 1.13 1.19 1.25	0.03 0.03 0.04 0.04 0.04
110 120 130 140 150											12.26 13.38 14.49 15.61	10.94 12.85 14.90 17.09	8.57 9.34 10.12 10.90 11.68	4.57 5.37 6.22 7.14 8.11	5.47 5.97 6.47 6.96 7.46	1.53 1.80 2.09 2.40 2.73	3.13 3.42 3.70 3.98 4.27	0.39 0.46 0.54 0.62 0.70	1.38 1.50 1.63 1.75 1.88	0.05 0.06 0.07 0.08 0.10
160 170 180 190 200													12.46 13.24 14.02 14.80 15.57	9.14 10.23 11.37 12.57 13.82	7.96 8.46 8.95 9.45 9.95	3.07 3.44 3.82 4.22 4.64	4.55 4.84 5.12 5.41 5.69	0.79 0.88 0.98 1.09 1.19	2.00 2.13 2.25 2.38 2.50	0.11 0.12 0.13 0.15 0.16
220 240 260 280 300															10.94 11.94 12.93 13.93 14.92	5.54 6.51 7.55 8.66 9.84	6.26 6.83 7.40 7.97 8.54	1.42 1.67 1.94 2.23 2.53	2.75 3.00 3.25 3.51 3.76	0.19 0.23 0.26 0.30 0.34
320 340 360 380 400		Shade			ts veloci caution		r 5 fps.								15.92	11.09	9.11 9.68 10.25 10.82 11.39	2.85 3.19 3.55 3.92 4.31	4.01 4.26 4.51 4.76 5.01	0.39 0.43 0.48 0.53 0.58
420 440 460 480 500																	11.95 12.52 13.09 13.66 14.23	4.72 5.14 5.59 6.04 6.52	5.26 5.51 5.76 6.01 6.26	0.64 0.70 0.76 0.82 0.88



POLYETHYLENE (PE) PLASTIC PIPE ID CONTROLLED

Size: ½" thru 4" Flow: 1 thru 500GPM
PE 3408 ASTM D-2239 C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	1/2	2 "	3/2	."	1	11	1!	/4 "	11	/ ₂ "	2	"	21	/ ₂ "	3	11	4	."
Avg.ID	0.6	522	0.8	324	1.0)49	1.3	380	1.6	510	2.0	067	2.4	169	3.0	068	4.()26
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Los
1	1.05	0.49	0.60	0.12	0.37	0.04	0.21	0.01	0.16	0.00								
2	2.11 3.16	1.76 3.73	1.20 1.80	0.45 0.95	0.74 1.11	0.14 0.29	0.43 0.64	0.04 0.08	0.31 0.47	0.02 0.04	0.19 0.29	0.01 0.01						
4	4.22	6.35	2.40	1.62	1.48	0.50	0.86	0.13	0.63	0.06	0.38	0.02	0.27	0.01				
5 6	5.27 6.33	9.60 13.46	3.00 3.61	2.44 3.43	1.85 2.22	0.76 1.06	1.07 1.29	0.20	0.79 0.94	0.09	0.48 0.57	0.03	0.33 0.40	0.01	0.26	0.01		
7	7.38	17.91	4.21	4.56	2.60	1.41	1.50	0.37	1.10	0.18	0.67	0.05	0.47	0.02	0.30	0.01		
8	8.44	22.93	4.81	5.84	2.97	1.80	1.71	0.47	1.26	0.22 0.28	0.76	0.07	0.54	0.03	0.35	0.01		
9 10	9.49 10.55	28.52 34.67	5.41 6.01	7.26 8.82	3.34 3.71	2.24 2.73	1.93 2.14	0.59 0.72	1.42 1.57	0.28	0.86 0.95	0.08 0.10	0.60 0.67	0.03 0.04	0.39 0.43	0.01 0.01		
12			7.21	12.37	4.45	3.82	2.57	1.01	1.89	0.48	1.15	0.14	0.80	0.06	0.52	0.02		
14 16			8.41 9.61	16.45 21.07	5.19 5.93	5.08 6.51	3.00 3.43	1.34 1.71	2.20 2.52	0.63 0.81	1.34 1.53	0.19 0.24	0.94 1.07	0.08 0.10	0.61 0.69	0.03 0.04	0.40	0.0
18			10.82	26.21	6.67	8.10	3.86	2.13	2.83	1.01	1.72	0.30	1.20	0.13	0.78	0.04	0.45	0.0
20			12.02	31.85	7.42 8.16	9.84	4.28 4.71	2.59 3.09	3.15 3.46	1.22	1.91 2.10	0.36	1.34 1.47	0.15	0.87 0.95	0.05	0.50 0.55	0.0
24					8.90	13.79	5.14	3.63	3.78	1.72	2.10	0.43	1.61	0.18	1.04	0.06	0.60	0.0
26					9.64	16.00	5.57	4.21	4.09	1.99	2.48	0.59	1.74	0.25	1.13	0.09	0.65	0.0
28 30					10.38 11.12	18.35 20.85	6.00 6.43	4.83 5.49	4.41 4.72	2.28 2.59	2.67 2.86	0.68 0.77	1.87 2.01	0.28 0.32	1.21 1.30	0.10 0.11	0.70 0.76	0.0
32					11.86	23.50	6.86	6.19	5.04	2.92	3.06	0.87	2.14	0.36	1.39	0.13	0.81	0.0
34 36					12.61	26.29	7.28 7.71	6.92 7.69	5.35 5.67	3.27 3.63	3.25 3.44	0.97 1.08	2.28 2.41	0.41 0.45	1.47 1.56	0.14 0.16	0.86 0.91	0.0
38							8.14	8.50	5.98	4.02	3.63	1.19	2.54	0.50	1.65	0.17	0.96	0.0
40							8.57	9.35	6.30	4.42	3.82	1.31	2.68	0.55	1.73	0.19	1.01	0.0
42 44							9.00 9.43	10.24 11.16	6.61 6.93	4.83 5.27	4.01 4.20	1.43 1.56	2.81 2.94	0.60 0.66	1.82 1.91	0.21 0.23	1.06 1.11	0.0
46							9.86	12.12	7.24	5.72	4.39	1.70	3.08	0.71	1.99	0.25	1.16	0.0
48 50							10.28 10.71	13.11 14.14	7.56 7.87	6.19 6.68	4.58 4.77	1.84 1.98	3.21 3.35	0.77 0.83	2.08 2.17	0.27 0.29	1.21 1.26	0.0
55							11.78	16.87	8.66	7.97	5.25	2.36	3.68	0.99	2.38	0.35	1.38	0.0
60							12.85	19.82	9.44	9.36	5.73	2.77	4.02	1.17	2.60	0.41	1.51	0.1
65 70									10.23 11.02	10.86 12.45	6.21 6.68	3.22 3.69	4.35 4.69	1.36 1.55	2.82 3.03	0.47 0.54	1.64 1.76	0.1 0.1
75									11.81	14.15	7.16	4.19	5.02	1.77	3.25	0.61	1.89	0.1
80 85									12.59 13.38	15.95 17.84	7.64 8.12	4.73 5.29	5.35 5.69	1.99 2.23	3.47 3.68	0.69 0.77	2.01 2.14	0.1 0.2
90											8.59	5.88	6.02	2.48	3.90	0.86	2.27	0.2
95 100											9.07 9.55	6.50 7.15	6.36 6.69	2.74 3.01	4.12 4.33	0.95 1.05	2.39 2.52	0.2 0.2
110											10.50	8.53	7.36	3.59	4.33	1.05	2.77	0.2
120											11.46	10.02	8.03	4.22	5.20	1.47	3.02	0.3
130 140											12.41 13.37	11.62 13.33	8.70 9.37	4.89 5.61	5.63 6.07	1.70 1.95	3.27 3.52	0.4 0.5
150													10.04	6.38	6.50	2.22	3.78	0.5
160 170													10.71 11.38	7.19 8.04	6.94 7.37	2.50 2.79	4.03 4.28	0.6
180													12.05	8.94	7.80	3.11	4.53	0.8
190 200													12.72 13.39	9.88 10.87	8.24 8.67	3.43 3.78	4.78 5.03	0.9
220													13.33	10.07	9.54	4.50	5.54	1.2
240															10.40	5.29	6.04	1.4
260 280															11.27 12.14	6.14 7.04	6.54 7.05	1.6 1.8
300															13.00	8.00	7.55	2.1
320 340		e													13.87	9.02	8.05 8.56	2.4
360		Shade		•	ts velocit caution		r 5 tps.										9.06	2.9
380 400			'	ose with	caution	•											9.57 10.07	3.3 3.6
420																	10.07	3.9
440																	11.08	4.3
460 480																	11.58 12.08	4.7 5.0
500																	12.59	5.4
							See pg !	93 for f	riction I	nss fori	mulas							





TYPE 'K' COPPER TUBING

Size: ½" thru 3" **Flow:** 1 thru 600GPM ASTM B 88 C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	1/2	"	5/8	"	3/4	"	1	"	11/	/ ₄ "	11/	/ "	2	"	21/	/ ₂ "	3	"
Avg.ID	0.5		0.6		0.7		0.9		1.2		1.4		1.9			135	2.9	07
Pipe OD	0.6		0.7		0.8		1.1		1.3		1.6		2.1			525	3.1	
Avg Wall	0.0	49	0.0	49	0.0		0.0		0.0		0.0		0.0			95	0.1	09
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss								
1	1.47	1.09	0.96	0.39	0.74	0.20	0.41	0.05	0.26	0.02								
2 3	2.94 4.41	3.94 8.35	1.92 2.88	1.40 2.97	1.47 2.21	0.73 1.55	0.82 1.24	0.18 0.38	0.53 0.79	0.06 0.13								
4	5.88	14.23	3.84	5.05	2.94	2.64	1.65	0.65	1.05	0.22								
5 6	7.35 8.81	21.51 30.15	4.80 5.76	7.64	3.68 4.41	3.99 5.59	2.06	0.98 1.37	1.32 1.58	0.33	1.12	0.20						
7	10.28	40.12	6.72	14.24	5.15	7.44	2.88	1.82	1.84	0.61	1.30	0.26						
8 9	11.75 13.22	51.37 63.90	7.68 8.64	18.24 22.68	5.88 6.62	9.53 11.85	3.30 3.71	2.33 2.90	2.11 2.37	0.78 0.97	1.49 1.67	0.34 0.42						
10 12	14.69	77.66	9.60	27.57	7.35	14.41	4.12	3.52	2.63	1.18	1.86	0.51	1 20	0.10				
14			11.52 13.44	38.64 51.41	8.82 10.29	20.20 26.87	4.95 5.77	4.94 6.57	3.16 3.69	1.66 2.21	2.23 2.60	0.71 0.95	1.28 1.49	0.18 0.24				
16 18			15.36 17.28	65.83 81.88	11.76 13.23	34.41 42.80	6.59 7.42	8.42 10.47	4.21 4.74	2.83 3.52	2.98 3.35	1.22 1.51	1.70 1.91	0.31 0.39				
20			17.20	01.00	14.70	52.02	8.24	12.72	5.26	4.28	3.72	1.84	2.13	0.47				
22 24					16.17 17.64	62.06 72.91	9.07 9.89	15.18 17.84	5.79 6.32	5.10 5.99	4.09 4.46	2.19 2.58	2.34 2.55	0.56 0.66	1.51 1.65	0.19 0.23	1.06 1.16	0.08 0.10
26							10.71	20.69	6.84	6.95	4.84	2.99	2.76	0.77	1.79	0.27	1.26	0.11
28 30							11.54 12.36	23.73 26.96	7.37 7.90	7.97 9.06	5.21 5.58	3.43 3.89	2.98 3.19	0.88 1.00	1.93 2.06	0.30 0.35	1.35 1.45	0.13 0.15
32 34							13.19	30.39	8.42	10.21	5.95	4.39	3.40	1.12	2.20	0.39 0.44	1.54	0.16
34 36							14.01 14.84	34.00 37.79	8.95 9.48	11.42 12.70	6.32 6.70	4.91 5.46	3.61 3.83	1.26 1.40	2.34 2.48	0.44	1.64 1.74	0.18 0.20
38 40							15.66 16.48	41.77 45.94	10.00 10.53	14.04 15.43	7.07 7.44	6.03 6.63	4.04 4.25	1.55 1.70	2.61 2.75	0.54 0.59	1.83 1.93	0.23 0.25
42							17.31	50.28	11.06	16.89	7.81	7.26	4.47	1.86	2.89	0.65	2.03	0.27
44 46									11.58 12.11	18.41 19.99	8.18 8.56	7.91 8.59	4.68 4.89	2.03 2.20	3.03 3.17	0.70 0.76	2.12 2.22	0.30 0.32
48									12.63	21.63	8.93	9.30	5.10	2.38	3.30	0.83	2.32	0.35
50 55									13.16 14.48	23.33	9.30 10.23	10.03	5.32 5.85	2.57 3.07	3.44 3.78	0.89 1.06	2.41	0.38
60									15.79	32.70	11.16	14.05	6.38	3.60	4.13	1.25	2.90	0.53
65 70									17.11 18.43	37.93 43.51	12.09 13.02	16.30 18.70	6.91 7.44	4.18 4.79	4.47 4.82	1.45 1.66	3.14 3.38	0.61 0.70
75											13.95	21.24	7.97	5.45	5.16	1.89	3.62	0.80
80 85											14.88 15.81	23.94 26.79	8.51 9.04	6.14 6.87	5.50 5.85	2.13 2.38	3.86 4.10	0.90 1.01
90 95											16.74 17.67	29.78 32.91	9.57 10.10	7.63 8.44	6.19 6.54	2.65 2.93	4.35 4.59	1.12 1.24
100											18.60	36.19	10.63	9.28	6.88	3.22	4.83	1.36
110 120													11.69 12.76	11.07 13.01	7.57 8.26	3.84 4.51	5.31 5.79	1.62 1.91
130													13.82	15.08	8.95	5.23	6.28	2.21
140 150													14.88 15.95	17.30 19.66	9.63 10.32	6.00 6.82	6.76 7.24	2.54 2.88
160													17.01	22.16	11.01	7.69	7.72	3.25
170 180													18.07	24.79	11.70 12.39	8.60 9.56	8.21 8.69	3.63 4.04
190 200															13.07 13.76	10.57 11.62	9.17 9.66	4.46 4.91
220															15.14	13.87	10.62	5.86
240 260															16.51 17.89	16.29 18.90	11.59 12.55	6.88 7.98
280															19.27	21.68	13.52	9.15
300 320																	14.48 15.45	10.40 11.72
340				•	ts veloci												16.42	13.11
360 380		Use	with cau	tion, who	ere wate	r hamme	r is a										17.38 18.35	14.58 16.11
400																		
420 440																		
460																		
480 500																		
						S	iee pg 9	3 for fr	iction l	oss forn	nulas							

FRICTION LOSS CHARACTERISTICS

TYPE 'L' COPPER TUBING

Size: ½" thru 3" Flow: 1 thru 500GPM C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	1/:	2"	5/	8"	3/2	,"	1	"	1	"	11	/ ₂ "	2	"	21	/2 "	3	"
Avg.ID		545		666		785		025		265		05		985		165		945
Pipe OD		525		750		375		125		375		25		125		525		25
Avg Wall		040)42)45		050		055		60		70		080		90
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.37	0.93	0.92	0.35	0.66	0.16	0.39	0.04	0.25	0.02	5	2033		2035	5	2033	5	2033
2	2.75 4.12	3.35 7.09	1.84 2.76	1.26 2.67	1.32 1.99	0.57 1.20	0.78 1.17	0.15 0.33	0.51 0.76	0.06 0.12								
4	5.49	12.09	3.68	4.56	2.65	2.05	1.55	0.56	1.02	0.20								
5 6	6.87 8.24	18.27 25.61	4.60 5.52	6.89 9.65	3.31 3.97	3.09 4.34	1.94 2.33	0.85 1.18	1.27	0.30	1.08	0.18						
7	9.62	34.07	6.44	12.84	4.63	5.77	2.72	1.58	1.78	0.57	1.26	0.24						
8 9	10.99 12.36	43.63 54.26	7.36 8.28	16.45 20.45	5.30 5.96	7.39 9.19	3.11 3.50	2.02 2.51	2.04 2.29	0.72 0.90	1.44 1.62	0.31 0.39						
10	13.74	65.95	9.20	24.86	6.62	11.17	3.88	3.05	2.55	1.10	1.80	0.47						
12 14			11.04 12.88	34.85 46.36	7.95 9.27	15.66 20.83	4.66 5.44	4.28 5.69	3.06 3.57	1.54 2.04	2.16 2.52	0.66 0.88	1.24 1.45	0.17 0.23				
16			14.72	59.37	10.59	26.68	6.21	7.28	4.08	2.62	2.88	1.12	1.66	0.29				
18 20			16.56	73.84	11.92 13.24	33.18 40.33	6.99 7.77	9.06 11.01	4.59 5.10	3.25 3.96	3.24 3.60	1.40 1.70	1.86 2.07	0.36 0.44				
22 24					14.57 15.89	48.11 56.53	8.54 9.32	13.14 15.44	5.61 6.12	4.72 5.55	3.96 4.32	2.03 2.38	2.28 2.49	0.53 0.62	1.48 1.61	0.18 0.22	1.03 1.13	0.08 0.09
26					13.03	30.33	10.10	17.90	6.63	6.43	4.68	2.76	2.69	0.72	1.75	0.25	1.22	0.11
28 30							10.87 11.65	20.54 23.33	7.14 7.65	7.38 8.38	5.04 5.40	3.17 3.60	2.90 3.11	0.82 0.94	1.88 2.01	0.29 0.33	1.32 1.41	0.12 0.14
32							12.43	26.30	8.16	9.45	5.76	4.06	3.31	1.05	2.15	0.37	1.51	0.15
34 36							13.20 13.98	29.42 32.71	8.67 9.18	10.57 11.75	6.12 6.48	4.54 5.05	3.52 3.73	1.18 1.31	2.28 2.42	0.41 0.46	1.60 1.69	0.17 0.19
38							14.76	36.15	9.69	12.99	6.84	5.58	3.93	1.45	2.55	0.51	1.79	0.21
40 42							15.53 16.31	39.75 43.51	10.20	14.28 15.63	7.21 7.57	6.13	4.14 4.35	1.59 1.75	2.69	0.56 0.61	1.88	0.23
44 46									11.22	17.04	7.93	7.32	4.56	1.90	2.95	0.66 0.72	2.07	0.28
48									11.73 12.24	18.50 20.02	8.29 8.65	7.94 8.60	4.76 4.97	2.07 2.24	3.09 3.22	0.72	2.16 2.26	0.30 0.33
50 55									12.75 14.02	21.59 25.76	9.01 9.91	9.27	5.18 5.70	2.41	3.36 3.69	0.84 1.00	2.35 2.59	0.35 0.42
60									15.30	30.26	10.81	13.00	6.21	3.38	4.03	1.18	2.82	0.50
65 70									16.57 17.85	35.10 40.26	11.71 12.61	15.07 17.29	6.73 7.25	3.92 4.50	4.36 4.70	1.37 1.57	3.06 3.29	0.57 0.66
75											13.51	19.65	7.77	5.11	5.04	1.78	3.53	0.75
80 85											14.41 15.31	22.14 24.77	8.28 8.80	5.76 6.44	5.37 5.71	2.01 2.25	3.76 4.00	0.84 0.94
90											16.21	27.54	9.32	7.16	6.04	2.50	4.23	1.05
95 100											17.11 18.01	30.44 33.47	9.84 10.35	7.91 8.70	6.38 6.71	2.76 3.03	4.47 4.70	1.16 1.28
110													11.39	10.38	7.39	3.62	5.17	1.52
120 130													12.43 13.46	12.20 14.15	8.06 8.73	4.25 4.93	5.65 6.12	1.79 2.07
140 150													14.50 15.53	16.23 18.44	9.40 10.07	5.66 6.43	6.59 7.06	2.38 2.70
160													16.57	20.78	10.74	7.24	7.53	3.05
170 180													17.60	23.25	11.41 12.09	8.11 9.01	8.00 8.47	3.41 3.79
190															12.76	9.96	8.94	4.19
200 220															13.43 14.77	10.95 13.07	9.41 10.35	4.61 5.50
240 260															16.12	15.35 17.80	11.29 12.23	6.46 7.49
280															17.46 18.80	20.42	13.17	8.59
300 320																	14.11 15.05	9.76 11.00
340		Shade	d area r	epresent	ts veloci	ties ove	r 7 fps.										15.99	12.31
360 380				tion, whe	ere watei ncern.		•										16.94 17.88	13.69 15.13
400																	17.00	13.13
420 440																		
460																		
480 500																		
						5	ee pg 9	3 for fr	iction L	oss forn	nulas							





TYPE 'M' COPPER TUBING

Size: ½" thru 3" Flow: 1 thru 500GPM C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	1/2	2"	5/	8"	3/4	."	1	"	11	/4 "	11	/ ₂ "	2	"	21	/ ₂ "	3	"
Avg.ID	0.5	69	0.6	590	0.8	311	1.0)55	1.2	91	1.5	27	2.0	09	2.4	195	2.9	81
Pipe OD	0.6	525	0.7	750	0.8	375	1.1	125	1.3	375	1.6	25	2.1	25	2.6	25	3.1	25
Avg Wall	0.0	28	0.0	030	0.0	32	0.0	35	0.0	142	0.0	49	0.0	58	0.0	65	0.0	72
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1 2	1.26 2.52	0.75 2.71	0.86 1.71	0.29 1.06	0.62 1.24	0.13 0.48	0.37 0.73	0.04 0.13	0.24 0.49	0.01 0.05								
3 4	3.78 5.04	5.75 9.80	2.57 3.43	2.25 3.83	1.86 2.48	1.03 1.75	1.10 1.47	0.29 0.49	0.73 0.98	0.11 0.18								
5	6.30	14.81	4.28	5.80	3.10	2.64	1.83	0.49	1.22	0.18								
6 7	7.56 8.82	20.76 27.62	5.14 6.00	8.13 10.81	3.72 4.34	3.70 4.92	2.20 2.57	1.03 1.37	1.47 1.71	0.39 0.51	1.05 1.22	0.17 0.23						
8	10.08	35.37	6.86	13.84	4.96	6.31	2.93	1.75	1.96	0.66	1.40	0.29						
9 10	11.34 12.60	44.00 53.48	7.71 8.57	17.22 20.93	5.58 6.20	7.84 9.53	3.30 3.67	2.18 2.65	2.20 2.45	0.82 0.99	1.57 1.75	0.36 0.44						
12 14			10.28 12.00	29.33 39.02	7.44 8.68	13.36 17.78	4.40 5.13	3.72 4.94	2.94 3.43	1.39 1.85	2.10 2.45	0.61 0.82	1.21 1.42	0.16 0.22				
16			13.71	49.97	9.93	22.77	5.87	6.33	3.92	2.37	2.80	1.05	1.62	0.28				
18 20			15.43 17.14	62.15 75.55	11.17 12.41	28.32 34.42	6.60 7.33	7.87 9.57	4.41 4.90	2.95 3.58	3.15 3.50	1.30 1.58	1.82 2.02	0.34 0.42				
22 24					13.65 14.89	41.06 48.24	8.06 8.80	11.42 13.41	5.39 5.88	4.28 5.02	3.85 4.20	1.89 2.22	2.22 2.43	0.50 0.58	1.44 1.57	0.17 0.20	1.01 1.10	0.07 0.09
26					14.03	40.24	9.53	15.56	6.36	5.83	4.55	2.57	2.63	0.68	1.70	0.24	1.19	0.10
28 30							10.26 11.00	17.85 20.28	6.85 7.34	6.68 7.59	4.90 5.25	2.95 3.35	2.83 3.03	0.78 0.88	1.84 1.97	0.27 0.31	1.29 1.38	0.11 0.13
32 34							11.73 12.46	22.85 25.57	7.83 8.32	8.56 9.57	5.60 5.95	3.78 4.23	3.23 3.44	0.99 1.11	2.10 2.23	0.35 0.39	1.47 1.56	0.15 0.16
36							13.20	28.42	8.81	10.64	6.30	4.70	3.64	1.24	2.36	0.43	1.65	0.18
38 40							13.93 14.66	31.42 34.55	9.30 9.79	11.76 12.94	6.65 7.00	5.20 5.71	3.84 4.04	1.37 1.50	2.49 2.62	0.48 0.52	1.74 1.84	0.20 0.22
42 44							15.40	37.81	10.28	14.16	7.35	6.26	4.25	1.65	2.75	0.57	1.93	0.24 0.26
46									10.77 11.26	15.43 16.76	7.70 8.05	6.82 7.40	4.45 4.65	1.79 1.95	2.88 3.01	0.63 0.68	2.02 2.11	0.29
48 50									11.75 12.24	18.13 19.56	8.40 8.75	8.01 8.64	4.85 5.05	2.11 2.27	3.15 3.28	0.73 0.79	2.20 2.30	0.31 0.33
55									13.46	23.33	9.62	10.31	5.56	2.71	3.60	0.95	2.53	0.40
60 65									14.69 15.91	27.41 31.79	10.50 11.37	12.11 14.04	6.07 6.57	3.19 3.70	3.93 4.26	1.11 1.29	2.75 2.98	0.47 0.54
70 75									17.14	36.47	12.25 13.12	16.11 18.31	7.08 7.58	4.24 4.82	4.59 4.92	1.48 1.68	3.21 3.44	0.62 0.71
80											14.00	20.63	8.09	5.43	5.24	1.89	3.67	0.80
85 90											14.87 15.75	23.08 25.66	8.59 9.10	6.07 6.75	5.57 5.90	2.12 2.35	3.90 4.13	0.89 0.99
95 100											16.62 17.50	28.36 31.19	9.60 10.11	7.46 8.21	6.23 6.55	2.60 2.86	4.36 4.59	1.09 1.20
110													11.12	9.79	7.21	3.41	5.05	1.44
120 130													12.13 13.14	11.51 13.34	7.87 8.52	4.01 4.65	5.51 5.97	1.69 1.96
140 150													14.15 15.16	15.31 17.39	9.18 9.83	5.33 6.06	6.43 6.89	2.24 2.55
160													16.17	19.60	10.49	6.83	7.35	2.87
170 180													17.18	21.93	11.14 11.80	7.64 8.50	7.81 8.26	3.21 3.57
190 200															12.45 13.11	9.39 10.33	8.72 9.18	3.95 4.34
220															14.42	12.32	10.10	5.18
240 260															15.73 17.04	14.47 16.79	11.02 11.94	6.09 7.06
280 300															18.35	19.25	12.86 13.77	8.10 9.20
320				_													14.69	10.37
340 360				•	ts velocit ere water												15.61 16.53	11.60 12.90
380 400		ose	vviui Cau		ncern.	nannne	1 12 d										17.45	14.26
420																		\vdash
440 460																		
480																		
500							00 89-6	2 for fo	iction L	occ form	aulae –							
							ee pg 9	3 101 Tr	iction l	oss torn	nuias							



HDPE DR 7 265 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 50 thru 4000GPM

ANSI/ASAE \$376.3 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	3	"	4	."	6	"	8	"	1	0"	12	2"	14	4"	10	6"	18	8"
Avg.ID	2.4	140	3.1	136	4.5	89	6.0)13	7.4	194	8.8	390	9.7	760	11.	156	12.	550
Pipe OD	3.5	500	4.5	500	6.6	525	8.6	525	10.	750	12.	750	14.	000	16.	000	18.	000
Avg Wall	0.5	530	0.6	682	1.0	18	1.3	306	1.0	528	1.9	30	2.1	20	2.4	122	2.7	725
Min Wall	0.5	500	0.6	543	0.9	46		232	1.!	536	1.8	321	2.0	000	2.2	86	2.5	571
Flow	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI	Velocity	PSI
GPM	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss	FPS	Loss
50 60	3.43 4.11	0.78 1.09	2.07 2.49	0.23 0.32	0.97 1.16	0.04 0.05	0.56 0.68	0.01 0.01	0.36 0.44	0.00 0.00	0.26 0.31	0.00 0.00	0.21 0.26	0.00 0.00	0.16 0.20	0.00	0.13 0.16	0.00 0.00
70	4.11	1.45	2.49	0.32	1.36	0.03	0.00	0.01	0.44	0.00	0.36	0.00	0.20	0.00	0.20	0.00	0.18	0.00
80 90	5.48 6.17	1.86 2.31	3.32 3.73	0.55 0.68	1.55 1.74	0.09 0.11	0.90 1.02	0.02 0.03	0.58 0.65	0.01 0.01	0.41 0.46	0.00	0.34 0.39	0.00	0.26 0.30	0.00	0.21 0.23	0.00
100	6.85	2.81	4.15	0.83	1.94	0.11	1.13	0.03	0.73	0.01	0.52	0.01	0.43	0.00	0.33	0.00	0.26	0.00
120 140	8.22 9.59	3.93 5.23	4.98 5.81	1.16 1.54	2.32 2.71	0.18 0.24	1.35 1.58	0.05 0.06	0.87 1.02	0.02 0.02	0.62 0.72	0.01 0.01	0.51 0.60	0.00 0.01	0.39 0.46	0.00	0.31 0.36	0.00
160	10.96	6.70	6.64	1.98	3.10	0.24	1.81	0.08	1.16	0.02	0.72	0.01	0.60	0.01	0.46	0.00	0.36	0.00
180			7.47	2.46	3.49	0.39	2.03	0.10	1.31	0.04	0.93	0.02	0.77	0.01	0.59	0.01	0.47	0.00
200 220			8.30 9.13	2.99 3.56	3.87 4.26	0.47 0.56	2.26 2.48	0.13 0.15	1.45 1.60	0.04 0.05	1.03 1.14	0.02 0.02	0.86 0.94	0.01 0.01	0.66 0.72	0.01 0.01	0.52 0.57	0.00
240 260			9.96 10.79	4.19 4.86	4.65 5.04	0.66 0.76	2.71 2.93	0.18 0.20	1.74 1.89	0.06 0.07	1.24 1.34	0.03 0.03	1.03 1.11	0.02 0.02	0.79 0.85	0.01 0.01	0.62 0.67	0.00 0.01
280			11.62	5.57	5.42	0.76	3.16	0.20	2.03	0.07	1.45	0.03	1.11	0.02	0.85	0.01	0.67	0.01
300 320					5.81 6.20	0.99	3.39 3.61	0.27 0.30	2.18 2.32	0.09 0.10	1.55	0.04 0.04	1.28 1.37	0.03 0.03	0.98 1.05	0.01 0.01	0.78 0.83	0.01 0.01
340					6.59	1.12 1.25	3.84	0.34	2.32	0.10	1.65 1.76	0.04	1.46	0.03	1.05	0.01	0.88	0.01
360 380					6.97 7.36	1.39 1.54	4.06 4.29	0.37 0.41	2.62 2.76	0.13 0.14	1.86 1.96	0.06 0.06	1.54 1.63	0.04 0.04	1.18 1.25	0.02 0.02	0.93 0.98	0.01 0.01
400					7.75	1.69	4.29	0.41	2.76	0.14	2.06	0.00	1.71	0.04	1.31	0.02	1.04	0.01
450 500					8.72 9.69	2.10 2.56	5.08 5.64	0.56 0.69	3.27 3.63	0.19 0.24	2.32 2.58	0.08 0.10	1.93 2.14	0.05 0.06	1.48 1.64	0.03 0.03	1.17 1.30	0.02 0.02
550					10.66	3.05	6.21	0.89	4.00	0.24	2.84	0.10	2.14	0.08	1.80	0.03	1.42	0.02
600					11.62	3.58	6.77	0.96	4.36	0.33	3.10	0.14	2.57	0.09	1.97	0.05	1.55	0.03
650 700							7.33 7.90	1.12 1.28	4.72 5.09	0.38 0.44	3.36 3.61	0.17 0.19	2.78 3.00	0.11 0.12	2.13 2.29	0.06 0.06	1.68 1.81	0.03 0.04
750 800							8.46 9.03	1.45 1.64	5.45 5.81	0.50 0.56	3.87 4.13	0.22 0.24	3.21 3.43	0.14 0.16	2.46 2.62	0.07 0.08	1.94 2.07	0.04 0.05
850							9.59	1.83	6.18	0.63	4.13	0.24	3.64	0.16	2.79	0.08	2.20	0.05
900 950							10.16	2.04 2.25	6.54 6.90	0.70 0.77	4.65 4.90	0.30 0.34	3.85 4.07	0.19 0.21	2.95 3.11	0.10 0.11	2.33 2.46	0.06 0.06
1000							10.72 11.28	2.25	7.26	0.77	5.16	0.34	4.07	0.21	3.11	0.11	2.46	0.06
1050 1100							11.85	2.71	7.63 7.99	0.93 1.01	5.42 5.68	0.40 0.44	4.50 4.71	0.26 0.28	3.44 3.61	0.13 0.15	2.72 2.85	0.08 0.08
1150									8.35	1.10	5.94	0.48	4.93	0.30	3.77	0.16	2.98	0.00
1200 1250									8.72 9.08	1.19 1.28	6.19 6.45	0.52 0.56	5.14 5.35	0.33 0.35	3.93 4.10	0.17 0.19	3.11 3.24	0.10 0.10
1300									9.44	1.38	6.71	0.60	5.57	038	4.26	0.20	3.37	0.11
1350 1400									9.81	1.48	6.97 7.23	0.64	5.78 6.00	0.41	4.43 4.59	0.21	3.50 3.63	0.12
1450									10.53	1.69	7.49	0.74	6.21	0.47	4.75	0.24	3.76	0.14
1500 1550									10.90 11.26	1.80 1.91	7.74 8.00	0.78 0.83	6.42 6.64	0.50 0.53	4.92 5.08	0.26 0.28	3.89 4.02	0.15 0.16
1600									11.62	2.03	8.26	0.88	6.85	0.56	5.25	0.29	4.14	0.16
1650 1700											8.52 8.78	0.93 0.99	7.07 7.28	0.59 0.63	5.41 5.57	0.31 0.33	4.27 4.40	0.17 0.18
1750											9.03	1.04	7.50	0.66	5.74	0.35	4.53	0.19
1800 1900											9.29 9.81	1.10 1.21	7.71 8.14	0.70 0.77	5.90 6.23	0.36 0.40	4.66 4.92	0.21 0.23
2000			1	1	1		1				10.32	1.33	8.57	0.85	6.56	0.44	5.18	0.25
2100 2200		Shade		•	ts veloci		r 5 fps.				10.84 11.36	1.46 1.59	8.99 9.42	0.93 1.01	6.88 7.21	0.48 0.53	5.44 5.70	0.27 0.30
2300				Use with	caution						11.87	1.73	9.85	1.10	7.54	0.57	5.96	0.32
2400 2500													10.28 10.71	1.19	7.87 8.20	0.62	6.22 6.48	0.35
2600													11.14	1.38	8.52	0.72	6.74	0.41
2700 2800													11.56 11.99	1.48 1.58	8.85 9.18	0.77 0.82	6.99 7.25	0.43 0.46
2900															9.51	0.88	7.51	0.50
3000 3300															9.83 10.82	0.94 1.12	7.77 8.55	0.53 0.63
3600															11.80	1.31	9.33	0.74
3900 4000																	10.10 10.36	0.86 0.90
						<u>S</u>	ee pg 9	3 for fr	iction lo	oss for <u>m</u>	nulas							



FRICTION LOSS CHARACTERISTICS

HDPE DR 9 200 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 50 thru 4000GPM

ANSI/ASAE S376.3 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

	AJAL	3" 4" 6"								JI LO3								
size	_						_	"		0"		2"		4"		6"		8"
Avg.ID		574		140		165		593		218		46		700		230		760
Pipe OD Avg Wall		00	4.5	500	6.6			525		750		750		000		000		000
Min Wall	0.4	113	0.5	30	0.7	80	1.0	016	1.2	266	1.5	02	1.6	550	1.8	385	2.1	120
Willi Wall	0.3	889	0.5	500	0.7	36	0.9	958	1.1	94	1.4	117	1.5	556	1.7	778	2.0	000
Flow GPM	Velocity FPS	PSI Loss																
50	2.85	0.50	1.72	0.15	0.80	0.02												
60 70	3.42 3.99	0.70 0.93	2.07 2.41	0.20 0.27	0.95 1.11	0.03 0.04												
80 90	4.56 5.14	1.19 1.48	2.76 3.10	0.35 0.43	1.27 1.43	0.05 0.07												
100	5.71	1.80	3.45	0.43	1.59	0.07	0.94	0.02										
120 140	6.85 7.99	2.52 3.35	4.14 4.83	0.74 0.98	1.91 2.23	0.11 0.15	1.13 1.31	0.03 0.04										
160	9.13	4.29	5.52	1.26	2.54	0.19	1.50	0.05	0.97	0.02								
180 200			6.21	1.57	2.86 3.18	0.24	1.69 1.88	0.07	1.09 1.21	0.02								
220			7.59	2.27	3.50	0.35	2.06	0.10	1.33	0.03								
240 260			8.27 8.96	2.67 3.10	3.82 4.13	0.41 0.47	2.25 2.44	0.11 0.13	1.45 1.57	0.04 0.04	1.03 1.12	0.02 0.02						
280			9.65	3.55	4.45	0.54	2.63	0.15	1.69	0.05	1.20	0.02	4.07					
300 320					4.77 5.09	0.61 0.69	2.82 3.00	0.17 0.19	1.81 1.93	0.06 0.07	1.29 1.37	0.03 0.03	1.07 1.14	0.02 0.02				
340 360					5.41 5.73	0.77 0.86	3.19 3.38	0.21 0.24	2.05 2.17	0.07 0.08	1.46 1.55	0.03 0.04	1.21 1.28	0.02 0.02				
380					6.04	0.95	3.57	0.26	2.30	0.09	1.63	0.04	1.35	0.02				
400 450					6.36 7.16	1.05 1.30	3.75 4.22	0.29 0.36	2.42 2.72	0.10 0.12	1.72 1.93	0.04 0.05	1.43 1.60	0.03	1.23	0.02		
500					7.95	1.58	4.69	0.44	3.02	0.15	2.15	0.07	1.78	0.04	1.36	0.02		
550 600					8.75 9.54	1.89 2.22	5.16 5.63	0.52 0.61	3.32 3.62	0.18 0.21	2.36 2.58	0.08 0.09	1.96 2.14	0.05 0.06	1.50 1.64	0.03 0.03	1.29	0.02
650							6.10	0.71	3.93	0.24	2.79	0.11	2.32	0.07	1.77	0.04	1.40	0.02
700 750							6.57 7.04	0.82 0.93	4.23 4.53	0.28 0.32	3.01 3.22	0.12 0.14	2.49 2.67	0.08 0.09	1.91 2.05	0.04 0.05	1.51 1.62	0.02 0.03
800 850							7.51 7.98	1.05 1.17	4.83 5.14	0.36 0.40	3.44 3.65	0.16 0.17	2.85 3.03	0.10 0.11	2.18 2.32	0.05 0.06	1.72 1.83	0.03 0.03
900							8.45	1.30	5.44	0.45	3.87	0.19	3.21	0.12	2.45	0.06	1.94	0.04
950 1000							8.92 9.39	1.44 1.58	5.74 6.04	0.49 0.54	4.08 4.30	0.21 0.24	3.39 3.56	0.14 0.15	2.59 2.73	0.07 0.08	2.05 2.15	0.04 0.04
1050 1100							9.86	1.73	6.34 6.65	0.59 0.65	4.51 4.72	0.26 0.28	3.74 3.92	0.16 0.18	2.86 3.00	0.09 0.09	2.26 2.37	0.05 0.05
1150									6.95	0.70	4.72	0.28	4.10	0.19	3.14	0.09	2.48	0.05
1200 1250									7.25 7.55	0.76 0.82	5.15 5.37	0.33 0.36	4.28 4.45	0.21 0.23	3.27 3.41	0.11 0.12	2.59 2.69	0.06 0.07
1300									7.85	0.88	5.58	0.38	4.63	0.24	3.55	0.13	2.80	0.07
1350 1400									8.16 8.46	0.94 1.01	5.80 6.01	0.41	4.81 4.99	0.26	3.68 3.82	0.14 0.15	2.91 3.02	0.08
1450									8.76	1.08	6.23	0.47	5.17	0.30	3.96	0.16	3.12	0.09
1500 1550									9.06 9.36	1.15 1.22	6.44 6.66	0.50 0.53	5.35 5.52	0.32 0.34	4.09 4.23	0.17 0.18	3.23 3.34	0.09 0.10
1600 1650									9.67 9.97	1.29	6.87 7.09	0.56 0.60	5.70 5.88	0.36	4.36 4.50	0.19 0.20	3.45 3.56	0.11 0.11
1700									3.31	1.37	7.30	0.63	6.06	0.40	4.64	0.21	3.66	0.12
1750 1800											7.52 7.73	0.67 0.70	6.24 6.41	0.42 0.45	4.77 4.91	0.22 0.23	3.77 3.88	0.12 0.13
1900											8.16	0.78	6.77	0.49	5.18	0.26	4.09	0.14
2000 2100		Shade	ed area r	enrecon	ts velocit	ties over	r 5 fns				8.59 9.02	0.85 0.93	7.13 7.48	0.54 0.59	5.46 5.73	0.28 0.31	4.31 4.53	0.16 0.17
2200 2300		Jilade			caution		J ips.				9.45 9.88	1.02 1.10	7.84 8.20	0.65 0.70	6.00 6.27	0.34 0.37	4.74 4.96	0.19 0.21
2400											3.00	1.10	8.55	0.76	6.55	0.40	5.17	0.22
2500 2600													8.91 9.27	0.82 0.88	6.82 7.09	0.43 0.46	5.39 5.60	0.24 0.26
2700													9.62	0.94	7.36	0.49	5.82	0.28
2800 2900													9.98	1.01	7.64 7.91	0.53 0.56	6.03 6.25	0.30 0.32
3000															8.18	0.60	6.46	0.34
3300 3600															9.00 9.82	0.71 0.84	7.11 7.76	0.40 0.47
3900 4000																	8.40 8.62	0.55 0.57
_ +000						S	ee na 9	3 for fr	ction lo	ss form	ulas						0.02	0.57
						,	ee pg J	o Tor III	action 10		Ando							



HDPE DR 11 160 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 50 thru 4000GPM

ANSI/ASAE \$376.3 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	3	"	4	."	6	"	8	"	1	0"	1	2"	14	4"	10	6"	18	8"
Avg.ID		326	3.6	532	-	49		963		578		292		300		914		532
Pipe OD		00		500		25		525		750		750		000		000		000
Avg Wall	0.3			134		38		331		036		229		350	l	543		734
Min Wall	0.3	18	0.4	109	0.6	02	0.7	784	0.9	977	1.1	159	1.2	273	1.4	155	1.6	636
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
50 60	2.55 3.07	0.38 0.53	1.55 1.86	0.11 0.16	0.71 0.86	0.02 0.02												
70	3.58	0.71	2.17	0.21	1.00	0.03												
80 90	4.09 4.60	0.91 1.13	2.47 2.78	0.27 0.33	1.14 1.28	0.04 0.05												
100	5.11	1.13	3.09	0.40	1.43	0.05	0.84	0.02										
120	6.13	1.92	3.71	0.57	1.71	0.09	1.01	0.02										
140 160	7.15 8.17	2.56 3.28	4.33 4.95	0.76 0.97	2.00 2.28	0.11 0.15	1.18 1.35	0.03 0.04										
180	9.20	4.08	5.57	1.20	2.57	0.18	1.51	0.05										
200	10.22	4.96	6.19	1.46	2.85	0.22	1.68	0.06	1.08	0.02	0.77	0.01						
220 240	11.24 12.26	5.91 6.95	6.80 7.42	1.74 2.05	3.14 3.42	0.27 0.31	1.85 2.02	0.07 0.09	1.19 1.30	0.03 0.03	0.85 0.92	0.01 0.01						
260	72.20		8.04	2.38	3.71	0.36	2.19	0.10	1.41	0.03	1.00	0.01						
280 300			8.66 9.28	2.73 3.10	3.99 4.28	0.41	2.36 2.52	0.11 0.13	1.52 1.63	0.04	1.08	0.02						
320			9.28	3.49	4.28	0.47	2.52	0.13	1.73	0.04	1.16 1.23	0.02						
340			10.52	3.91	4.85	0.59	2.86	0.16	1.84	0.06	1.31	0.02	1.09	0.02				
360 380			11.13	4.34	5.13 5.42	0.66 0.73	3.03 3.20	0.18 0.20	1.95 2.06	0.06 0.07	1.39 1.46	0.03 0.03	1.15 1.21	0.02 0.02				
400					5.70	0.80	3.37	0.22	2.17	0.08	1.54	0.03	1.28	0.02				
450					6.42	1.00	3.79	0.28	2.44	0.09	1.73	0.04	1.44	0.03				
500 550					7.13 7.84	1.21 1.45	4.21 4.63	0.34 0.40	2.71 2.98	0.12 0.14	1.93 2.12	0.05 0.06	1.60 1.76	0.03 0.04	1.22 1.35	0.02 0.02		
600					8.56	1.70	5.05	0.47	3.25	0.16	2.31	0.07	1.92	0.04	1.47	0.02		
650					9.27 9.98	1.97	5.47	0.55	3.52 3.79	0.19 0.21	2.50 2.70	0.08	2.08	0.05	1.59	0.03	1 25	0.0
700 750					10.69	2.26 2.57	5.89 6.31	0.63 0.71	4.06	0.21	2.70	0.09 0.11	2.24 2.40	0.06 0.07	1.71 1.83	0.03 0.04	1.35 1.45	0.0
800							6.73	0.80	4.33	0.27	3.08	0.12	2.56	0.08	1.96	0.04	1.55	0.0
850 900							7.15 7.57	0.90 1.00	4.61 4.88	0.31	3.27 3.47	0.13 0.15	2.72	0.09	2.08	0.04	1.64	0.0
950							7.99	1.10	5.15	0.34	3.66	0.15	3.04	0.10	2.32	0.05	1.84	0.0
1000							8.42	1.21	5.42	0.42	3.85	0.18	3.20	0.12	2.45	0.06	1.93	0.0
1050 1100							8.84 9.26	1.33 1.45	5.69 5.96	0.45 0.50	4.04 4.24	0.20 0.22	3.36 3.51	0.13 0.14	2.57 2.69	0.07 0.07	2.03 2.13	0.0
1150							9.68	1.57	6.23	0.54	4.43	0.23	3.67	0.15	2.81	0.08	2.22	0.0
1200 1250							10.10 10.52	1.70 1.83	6.50 6.77	0.58 0.63	4.62 4.81	0.25 0.27	3.83 3.99	0.16 0.17	2.94 3.06	0.08	2.32 2.42	0.0
1300							10.52	1.03	7.04	0.68	5.01	0.27	4.15	0.17	3.18	0.09	2.42	0.0
1350									7.31	0.72	5.20	0.32	4.31	0.20	3.30	0.10	2.61	0.0
1400 1450									7.58 7.86	0.78 0.83	5.39 5.59	0.34 0.36	4.47 4.63	0.21 0.23	3.43 3.55	0.11 0.12	2.70 2.80	0.0
1500									8.13	0.88	5.78	0.38	4.79	0.24	3.67	0.13	2.90	0.0
1550 1600									8.40 8.67	0.94 0.99	5.97 6.16	0.41 0.43	4.95 5.11	0.26 0.27	3.79 3.91	0.14 0.14	2.99 3.09	0.0
1650									8.94	1.05	6.36	0.43	5.27	0.27	4.04	0.14	3.19	0.0
1700									9.21	1.11	6.55	0.48	5.43	0.31	4.16	0.16	3.28	0.0
1750 1800									9.48 9.75	1.17 1.23	6.74 6.93	0.51 0.54	5.59 5.75	0.32 0.34	4.28 4.40	0.17 0.18	3.38 3.48	0.
1900	<u> </u>								10.29	1.36	7.32	0.59	6.07	0.38	4.65	0.20	3.67	0.1
2000											7.70	0.65	6.39	0.42	4.89	0.22	3.86	0.
2100 2200											8.09 8.47	0.72 0.78	6.71 7.03	0.45 0.50	5.14 5.38	0.24 0.26	4.06 4.25	0.
2300											8.86	0.85	7.35	0.54	5.63	0.28	4.44	0.
2400 2500													7.67 7.99	0.58	5.87 6.12	0.30	4.64 4.83	0.
2600		Shada	d area re	enrecon	ts velocit	ies over	5 fnc						7.99 8.31	0.63	6.12	0.33	4.83 5.02	0.2
2700		Silade		•	is velocii i caution		o ibs.						8.63	0.72	6.61	0.38	5.22	0.2
2800 2900				JJC WILL	. caation	•							8.95	0.77	6.85 7.09	0.40 0.43	5.41 5.60	0.2
3000															7.34	0.45	5.80	0
3300															8.07	0.55	6.38	0.
3600 3900															8.81	0.64	6.96 7.53	0
4000																	7.73	0.4
							See pg S											





HDPE DR 13.5 128 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 1 thru 4000GPM

ANSI/ASAE S376.2 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	3	II	4	,"	6	"	8	3"	10	0"	12	2"	14	1"	10	6"	18	8"
Avg.ID	2.9	50	3.7	794	5.5	83	7.3	269	9.0	062	10.	748	11.	802	13.	488	15.	174
Pipe OD	3.5	500	4.5	500	6.6	25	8.0	625	10.	750	12.	750	14.	000	16.	000	18.	000
Avg Wall	0.2	275	0.3	353	0.5	21	0.0	578	0.8	344	1.0	01	1.0	99	1.2	256	1.4	113
Min Wall	0.2	259	0.3	333	0.4	91	0.0	639	0.7	796	0.9	44	1.0	37	1.1	85	1.3	333
Flow GPM	Velocity FPS	PSI Loss																
50 60	2.34 2.81	0.31 0.43	1.42 1.70	0.09 0.13	0.65 0.79	0.01 0.02												
70	3.28	0.58	1.98	0.17	0.92	0.03												
80 90	3.75 4.22	0.74 0.92	2.27 2.55	0.22 0.27	1.05 1.18	0.03 0.04												
100 120	4.69 5.63	1.11 1.56	2.83 3.40	0.33 0.46	1.31 1.57	0.05 0.07	0.77 0.93	0.01 0.02										
140	6.56	2.08	3.97	0.61	1.83	0.09	1.08	0.03										
160 180	7.50 8.44	2.66 3.31	4.54 5.10	0.78 0.97	2.09 2.36	0.12 0.15	1.24 1.39	0.03 0.04										
200		3.3.	5.67	1.18	2.62	0.18	1.54	0.05	0.99	0.02	0.71	0.01						
220 240			6.24 6.80	1.41 1.66	2.88 3.14	0.22 0.25	1.70 1.85	0.06 0.07	1.09 1.19	0.02 0.02	0.78 0.85	0.01 0.01						
260			7.37	1.92	3.40	0.29	2.01	0.08	1.29	0.03	0.92	0.01						
280 300			7.94	2.20	3.67 3.93	0.34	2.16 2.32	0.09 0.11	1.39 1.49	0.03	0.99 1.06	0.01						
320 340					4.19 4.45	0.43 0.48	2.47 2.63	0.12 0.13	1.59 1.69	0.04 0.05	1.13 1.20	0.02 0.02	1.00	0.01				
360					4.71	0.54	2.78	0.15	1.79	0.05	1.27	0.02	1.05	0.01				
380 400					4.97 5.24	0.59	2.93 3.09	0.16 0.18	1.89	0.06	1.34 1.41	0.02	1.11	0.02				
450					5.89	0.81	3.47	0.22	2.24	0.08	1.59	0.03	1.32	0.02				
500 550					6.54 7.20	0.98 1.17	3.86 4.25	0.27 0.33	2.48 2.73	0.09 0.11	1.77 1.94	0.04 0.05	1.46 1.61	0.03 0.03	1.12 1.23	0.01 0.02		
600					7.85	1.38	4.63	0.38	2.98	0.13	2.12	0.06	1.76	0.04	1.35	0.02		
650 700					8.51	1.60	5.02 5.41	0.44 0.51	3.23 3.48	0.15 0.17	2.30 2.47	0.07 0.08	1.90 2.05	0.04 0.05	1.46 1.57	0.02 0.03	1.24	0.01
750 800							5.79 6.18	0.58 0.65	3.73 3.97	0.20 0.22	2.65 2.83	0.09 010	2.20 2.34	0.05 0.06	1.68 1.79	0.03 0.03	1.33 1.42	0.02 0.02
850							6.56	0.73	4.22	0.25	3.00	0.11	2.49	0.07	1.91	0.04	1.51	0.02
900 950							6.95 7.34	0.81 0.90	4.47 4.72	0.28 0.31	3.18 3.36	0.12 0.13	2.64 2.78	0.08 0.08	2.02 2.13	0.04 0.04	1.59 1.68	0.02 0.02
1000							7.72	0.98	4.97	0.34	3.53	0.15	2.93	0.09	2.24	0.05	1.77	0.03
1050 1100							8.11	1.08	5.22 5.47	0.37 0.40	3.71 3.89	0.16 0.18	3.08 3.22	0.10 0.11	2.35 2.47	0.05 0.06	1.86 1.95	0.03 0.03
1150									5.71	0.44	4.06	0.19	3.37	0.12	2.58	0.06	2.04	0.04
1200 1250									5.96 6.21	0.47 0.51	4.24 4.41	0.21 0.22	3.52 3.66	0.13 0.14	2.69 2.80	0.07 0.07	2.13 2.21	0.04 0.04
1300 1350									6.46 6.71	0.55 0.59	4.59 4.77	0.24 0.26	3.81 3.95	0.15 0.16	2.92 3.03	0.08 0.08	2.30 2.39	0.04 0.05
1400									6.96	0.63	4.94	0.27	4.10	0.17	3.14	0.09	2.48	0.05
1450 1500									7.20 7.45	0.67 0.71	5.12 5.30	0.29 0.31	4.25 4.39	0.19 0.20	3.25 3.36	0.10 0.10	2.57 2.66	0.05 0.06
1550 1600									7.70 7.95	0.76 0.80	5.47 5.65	0.33 0.35	4.54 4.69	0.21 0.22	3.48 3.59	0.11 0.12	2.75 2.84	0.06 0.07
1650									8.20	0.85	5.83	0.37	4.83	0.24	3.70	0.12	2.92	0.07
1700 1750											6.00 6.18	0.39 0.41	4.98 5.13	0.25 0.26	3.81 3.92	0.13 0.14	3.01 3.10	0.07 0.08
1800											6.36	0.44	5.27	0.28	4.04	0.14	3.19	0.08
1900 2000											6.71 7.06	0.48	5.57 5.86	0.31	4.26 4.49	0.16	3.37 3.54	0.09
2100											7.42	0.58	6.15	0.37	4.71	0.19	3.72	0.11
2200 2300											7.77 8.12	0.63 0.69	6.44 6.74	0.40 0.44	4.93 5.16	0.21 0.23	3.90 4.08	0.12 0.13
2400 2500													7.03 7.32	0.47	5.38 5.61	0.25	4.25 4.43	0.14
2600		Shade	d area r	epresent	ts velocit	ies ovei	5 fps.						7.62	0.55	5.83	0.29	4.61	0.16
2700 2800				•	caution								7.91 8.20	0.59 0.63	6.06 6.28	0.31 0.33	4.78 4.96	0.17 0.18
2900															6.50	0.35	5.14	0.20
3000 3300															6.73 7.40	0.37 0.44	5.32 5.85	0.21 0.25
3600 3900															8.07	0.52	6.38 6.91	0.29 0.34
4000																	7.09	0.34
						:	See pg !	93 for fi	riction I	oss for	nulas							

FRICTION LOSS CHARACTERISTICS

C900 DR 18 CLASS 150 (C.I.O.D.)

Size: 4" thru 12" Flow: 25 thru 8500GPM

AWWA C900 ASTM D1784 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT

Δ	WWA C		TM D1784	C=150			R 100 FEE		(PSI/100 I	FT)
size	4	."	6	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<u>8</u>	3"	1	0 "	1	2"
Avg.ID Pipe OD Avg Wall Min Wall	4.8 0.3	234 800 283 267	6.9 0.4	088 900 406 383	9.0 0.!	984 950 533 503	11. 0.6	792 100 554 517	13. 0.:	646 200 777 733
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 450 550 600 700 800 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2200 2200 2200 2200 2200 2200 2500 2600 2700 2800	0.57 1.14 1.71 2.28 2.84 3.41 3.98 4.55 5.12 5.69 6.26 6.83 7.40 7.97 8.53 9.10	0.01 0.05 0.11 0.19 0.29 0.41 0.54 0.69 0.86 1.05 1.25 1.47 1.70 1.95 2.22 2.50	0.28 0.55 0.83 1.10 1.38 1.65 1.93 2.20 2.48 2.75 3.03 3.30 3.58 3.85 4.13 4.40 4.95 5.50 6.60 7.71 8.81 9.91	0.00 0.01 0.02 0.03 0.05 0.07 0.09 0.12 0.15 0.18 0.21 0.25 0.29 0.33 0.38 0.43 0.53 0.65 0.77 0.91 1.20 1.54 1.92	0.16 0.32 0.48 0.64 0.80 0.96 1.12 1.28 1.44 1.60 1.76 1.92 2.08 2.24 2.40 2.56 2.88 3.20 3.52 3.84 4.48 5.12 5.76 6.40 7.04 7.68 8.32 8.96 9.60 10.24	0.00 0.00 0.01 0.01 0.02 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.14 0.17 0.21 0.24 0.32 0.41 0.51 0.62 0.74 0.87 1.01 1.16 1.32 1.49	0.11 0.21 0.32 0.43 0.53 0.64 0.74 0.85 0.96 1.06 1.17 1.28 1.38 1.49 1.60 1.70 1.91 2.13 2.34 2.55 2.98 3.40 3.83 4.26 4.68 5.11 5.53 5.96 6.38 6.81 7.23 7.66 8.08 8.51 8.94 9.36	0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.01	0.08 0.15 0.23 0.30 0.38 0.45 0.53 0.60 0.68 0.75 0.83 0.90 0.98 1.05 1.13 1.20 1.35 1.50 1.65 1.80 2.11 2.41 2.71 3.01 3.31 3.61 3.91 4.21 4.51 4.81 5.11 5.41 5.72 6.02 6.32 6.62 6.92 7.22 7.52 7.82	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0
2800 2900 3000 3100 3200 3300 3400 3500 3600 3800 4000 4200 4400 4600 4800 5000 5500 6000 6500 7500 8000 8500		Shaded	area represen Use with	n caution.	ver 5 fps.					





FRICTION LOSS CHARACTERISTICS

C900 DR 25 CLASS 100 (C.I.O.D.)

Size: 4" thru 12" Flow: 25 thru 8500GPM AWWA C900 ASTM D1784 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

			IVI D I 7 6 4			I LUSS PEI				
size	4	, "	6	,"	3	3"	10	0"	1.	2"
Avg.ID	4.	392	6.3	314	8.	282	10.	158	12.	080
Pipe OD		800		900		050		100		200
Avg Wall		204		293		384		171		560
_		192		276		362		144		528
Min Wall	<u> </u>	132	0.7		0.	, , , , , , , , , , , , , , , , , , , ,	0		U.	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
25 50	0.53 1.06	0.01 0.04	0.26 0.51	0.00 0.01	0.15 0.30	0.00 0.00	0.10 0.20	0.00 0.00	0.07 0.14	0.00 0.00
75	1.59	0.09	0.77	0.02	0.45	0.00	0.30	0.00	0.21	0.00
100	2.12	0.16	1.02	0.03	0.59	0.01	0.40	0.00	0.28	0.00
125	2.64	0.24	1.28	0.04	0.74	0.01	0.49	0.00	0.35	0.00
150 175	3.17 3.70	0.34 0.45	1.54 1.79	0.06 0.08	0.89 1.04	0.02 0.02	0.59 0.69	0.01 0.01	0.42 0.49	0.00 0.00
200	4.23	0.58	2.05	0.10	1.19	0.02	0.79	0.01	0.56	0.00
225	4.76	0.72	2.30	0.12	1.34	0.03	0.89	0.01	0.63	0.01
250	5.29	0.88	2.56	0.15	1.49	0.04	0.99	0.01	0.70	0.01
275	5.82	1.05	2.81	0.18	1.64	0.05	1.09	0.02	0.77	0.01
300 325	6.35 6.87	1.23 1.43	3.07 3.33	0.21 0.24	1.78 1.93	0.06 0.07	1.19 1.29	0.02 0.02	0.84 0.91	0.01 0.01
350	7.40	1.63	3.58	0.24	2.08	0.07	1.38	0.02	0.98	0.01
375			3.84	0.32	2.23	0.08	1.48	0.03	1.05	0.01
400			4.09	0.36	2.38	0.10	1.58	0.04	1.12	0.02
450 500			4.61 5.12	0.45 0.54	2.68 2.97	0.12 0.14	1.78 1.98	0.04 0.05	1.26 1.40	0.02 0.02
550			5.63	0.54	3.27	0.14	2.17	0.05	1.54	0.02
600			6.14	0.76	3.57	0.20	2.37	0.08	1.68	0.03
700			7.16	1.01	4.16	0.27	2.77	0.10	1.96	0.04
800 900			8.19 9.21	1.29 1.61	4.76 5.35	0.35 0.43	3.16 3.56	0.13 0.16	2.24 2.52	0.05 0.07
1000			10.23	1.01	5.95	0.43	3.95	0.16	2.52	0.07
1100					6.54	0.62	4.35	0.23	3.08	0.10
1200					7.14	0.73	4.74	0.27	3.36	0.12
1300					7.73	0.85	5.14	0.31	3.63	0.14
1400 1500					8.33 8.92	0.97 1.11	5.54 5.93	0.36 0.41	3.91 4.19	0.16 0.18
1600					9.52	1.25	6.33	0.46	4.47	0.20
1700							6.72	0.52	4.75	0.22
1800							7.12	0.57	5.03	0.25
1900 2000							7.51 7.91	0.63 0.70	5.31 5.59	0.27 0.30
2100							8.30	0.76	5.87	0.33
2200							8.70	0.83	6.15	0.36
2300									6.43	0.39
2400 2500									6.71 6.99	0.42 0.45
2600									7.27	0.49
2700									7.55	0.52
2800									7.83	0.56
2900 3000									8.11 8.39	0.60 0.64
3100									8.67	0.68
3200										
3300										
3400 3500										
3600										
3800										
3900 4000										
4000 4200										
4400										
4600										
4800		Shaded	area represen	ts velocities o	ver 5 fps.					
5000 5500			Use with	caution.						
6000										
6500										
7000										
7500 8000										
8500										
				Coo. mar. 0.3	for friction	lace farmula				
				See pg 93	tor inction	loss formulas				



PVC CLASS 200 IPS PLASTIC PIPE

Size: 6" thru 18" Flow: 20 thru 4700GPM

ANSI/ASAE \$376.2 ASTM 2241 SDR21 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	6	,"	8	, II	10	0"	1	2"	14	4"	1	6"	1	8"
Avg.ID	5.9	955	7.7	755	9.6	666	11.	464	12.	588	14.	384	15.	246
Pipe OD	6.6	525	8.6			750		750	14.	000		000	18.	000
Avg Wall		335	0.4		0.5	542		543		706		308		377
Min Wall		316		110		511		506		666		762		357
Flow GPM	Velocity FPS	PSI Loss												
20	0.23	0.00	0.14	0.00	0.09	0.00	0.06	0.00	0.05	0.00	0.04	0.00	0.04	0.00
40 60	0.46 0.69	0.01 0.01	0.27 0.41	0.00	0.17 0.26	0.00	0.12 0.19	0.00	0.10 0.15	0.00 0.00	0.08 0.12	0.00 0.00	0.07 0.11	0.00 0.00
80	0.69	0.01	0.41	0.00	0.26	0.00	0.19	0.00	0.13	0.00	0.12	0.00	0.11	0.00
100	1.15	0.04	0.68	0.01	0.44	0.00	0.31	0.00	0.26	0.00	0.20	0.00	0.18	0.00
150 200	1.73 2.30	0.08 0.13	1.02 1.36	0.02 0.04	0.66 0.87	0.01 0.01	0.47 0.62	0.00 0.01	0.39 0.51	0.00	0.30 0.39	0.00 0.00	0.26 0.35	0.00 0.00
250	2.88	0.13	1.70	0.04	1.09	0.01	0.78	0.01	0.64	0.00	0.49	0.00	0.44	0.00
300	3.45	0.28	2.04	0.08	1.31	0.03	0.93	0.01	0.77	0.01	0.59	0.00	0.53	0.00
350 400	4.03	0.37 0.48	2.37	0.10	1.53	0.04	1.09 1.24	0.02	0.90 1.03	0.01	0.69	0.01	0.61	0.00
450	5.18	0.59	3.05	0.16	1.97	0.06	1.40	0.02	1.16	0.02	0.89	0.01	0.79	0.01
500	5.75	0.72	3.39	0.20	2.18	0.07	1.55	0.03	1.29	0.02	0.99	0.01	0.88	0.01
550 600	6.33 6.90	0.86 1.01	3.73 4.07	0.24 0.28	2.40 2.62	0.08 0.10	1.71 1.86	0.04 0.04	1.42 1.54	0.02 0.03	1.08 1.18	0.01 0.01	0.97 1.05	0.01 0.01
650	7.48	1.17	4.41	0.32	2.84	0.11	2.02	0.05	1.67	0.03	1.28	0.02	1.14	0.01
700 750	8.05 8.63	1.34 1.52	4.75 5.09	0.37 0.42	3.06 3.28	0.13 0.14	2.17 2.33	0.06 0.06	1.80 1.93	0.04 0.04	1.38 1.48	0.02 0.02	1.23 1.32	0.01 0.02
800	9.20	1.72	5.43	0.42	3.49	0.14	2.33	0.06	2.06	0.04	1.48	0.02	1.40	0.02
850	9.78	1.92	5.77	0.53	3.71	0.18	2.64	0.08	2.19	0.05	1.68	0.03	1.49	0.02
900 950			6.11 6.44	0.59 0.65	3.93 4.15	0.20 0.22	2.79 2.95	0.09 0.10	2.32 2.45	0.06 0.06	1.77 1.87	0.03 0.03	1.58 1.67	0.02 0.02
1000			6.78	0.72	4.37	0.25	3.10	0.11	2.57	0.07	1.97	0.04	1.76	0.03
1050 1100			7.12 7.46	0.79 0.86	4.59 4.80	0.27 0.29	3.26 3.41	0.12 0.13	2.70 2.83	0.07 0.08	2.07 2.17	0.04 0.04	1.84 1.93	0.03 0.03
1150			7.46	0.86	5.02	0.29	3.41	0.13	2.83	0.08	2.17	0.04	2.02	0.03
1200					5.24	0.34	3.73	0.15	3.09	0.10	2.37	0.05	2.11	0.04
1250 1300					5.46 5.68	0.37 0.40	3.88 4.04	0.16 0.17	3.22 3.35	0.10 0.11	2.46 2.56	0.05 0.06	2.19 2.28	0.04 0.04
1350					5.90	0.40	4.19	0.17	3.48	0.11	2.66	0.06	2.26	0.04
1400					6.11	0.46	4.35	0.20	3.60	0.13	2.76	0.07	2.46	0.05
1450 1500					6.33 6.55	0.49 0.52	4.50 4.66	0.21 0.23	3.73 3.86	0.14 0.14	2.86 2.96	0.07 0.08	2.55 2.63	0.05 0.06
1600					6.99	0.59	4.97	0.26	4.12	0.16	3.16	0.08	2.81	0.06
1700					7.42	0.66	5.28	0.29	4.38	0.18	3.35	0.09	2.98	0.07
1800 1900							5.59 5.90	0.32 0.35	4.63 4.89	0.20 0.22	3.55 3.75	0.11 0.12	3.16 3.34	0.08 0.09
2000							6.21	0.39	5.15	0.25	3.94	0.13	3.51	0.10
2100 2200							6.52 6.83	0.42 0.46	5.41 5.66	0.27 0.29	4.14 4.34	0.14 0.15	3.69 3.86	0.11 0.12
2300							7.14	0.40	5.92	0.23	4.54	0.13	4.04	0.12
2400							7.45	0.54	6.18	0.34	4.73	0.18	4.21	0.14
2500 2600							7.76 8.07	0.59 0.63	6.44 6.69	0.37 0.40	4.93 5.13	0.19 0.21	4.39 4.56	0.15 0.16
2700							8.38	0.67	6.95	0.43	5.32	0.22	4.74	0.17
2800							8.69	0.72	7.21	0.46	5.52	0.24	4.91	0.18
2900 3000							9.00 9.31	0.77 0.82	7.47	0.49 0.52	5.72 5.92	0.26 0.27	5.09	0.19 0.20
3100							9.62	0.87	7.98	0.55	6.11	0.29	5.44	0.22
3200 3300							9.93	0.92	8.24 8.50	0.59	6.31 6.51	0.31	5.62 5.79	0.23
3400 3400									8.50 8.75	0.62 0.66	6.70	0.32	5.79	0.24
3500									9.01	0.69	6.90	0.36	6.14	0.27
3600 3700									9.27 9.53	0.73 0.77	7.10 7.30	0.38 0.40	6.32 6.49	0.29 0.30
3800					I		1				7.49	0.42	6.67	0.32
3900 4000		Sha	aded area	represen	ts velociti	es over 5	fps.				7.69	0.44	6.85	0.33
4000 4100				Use with	caution.						7.89 8.09	0.46 0.48	7.02 7.20	0.35 0.37
4200											8.28	0.51	7.37	0.38
4300 4400													7.55 7.72	0.40 0.42
4500 4500													7.72	0.42
4600													8.07	0.45
4700													8.25	0.47
					See p	g 93 for	friction I	oss form	ulas					





PVC SCHEDULE 40 IPS PLASTIC PIPE

Size: 4" thru 12" Flow: 10 thru 3000GPM

ASTM D1785 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

		///// D170								2//
size		ļ "	-	"		3"		0 "		2"
Avg.ID		998		031		942		976		889
Pipe OD		500		525		625		750		750
Avg Wall		251		297		342	0.3	387		131
Min Wall	0.2	237	0.:	280	0.	322	0.3	365	0.4	106
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
10 20	0.26 0.51	0.00 0.01	0.11 0.22	0.00 0.00	0.06 0.13	0.00 0.00	0.04 0.08	0.00 0.00	0.03 0.06	0.00 0.00
30	0.77	0.01	0.22	0.00	0.13	0.00	0.00	0.00	0.00	0.00
40	1.02	0.05	0.45	0.01	0.26	0.00	0.16	0.00	0.12	0.00
50 60	1.28	0.07 0.10	0.56 0.67	0.01 0.01	0.32 0.39	0.00	0.20 0.25	0.00	0.14 0.17	0.00
70	1.79	0.10	0.67	0.01	0.39	0.00	0.29	0.00	0.17	0.00
80	2.04	0.17	0.90	0.02	0.52	0.01	0.33	0.00	0.23	0.00
90	2.30	0.21	1.01	0.03	0.58	0.01	0.37	0.00	0.26	0.00
100 120	2.55 3.06	0.25 0.36	1.12 1.35	0.03 0.05	0.65 0.78	0.01	0.41 0.49	0.00	0.29 0.35	0.00
140	3.57	0.47	1.57	0.05	0.78	0.01	0.49	0.00	0.40	0.00
160	4.08	0.61	1.79	0.08	1.03	0.02	0.66	0.01	0.46	0.00
180	4.59	0.75	2.02	0.10	1.16	0.03	0.74	0.01	0.52	0.00
200 225	5.11	0.92 1.14	2.24	0.12 0.15	1.29 1.46	0.03 0.04	0.82 0.92	0.01 0.01	0.58 0.65	0.00 0.01
225 250	6.38	1.14	2.52	0.15	1.46	0.04	1.02	0.01	0.65	0.01
275	7.02	1.65	3.08	0.22	1.78	0.06	1.13	0.02	0.79	0.01
300 325	7.66 8.30	1.94 2.25	3.37 3.65	0.26 0.30	1.94 2.10	0.07 0.08	1.23 1.33	0.02 0.03	0.87 0.94	0.01 0.01
350	8.93	2.23	3.93	0.35	2.10	0.08	1.43	0.03	1.01	0.01
375	0.55	2.30	4.21	0.40	2.43	0.10	1.54	0.03	1.08	0.01
400			4.49	0.45	2.59	0.12	1.64	0.04	1.15	0.02
425 450			4.77 5.05	0.50 0.56	2.75 2.91	0.13 0.15	1.74 1.84	0.04 0.05	1.23 1.30	0.02 0.02
475			5.33	0.62	3.07	0.15	1.95	0.05	1.37	0.02
500			5.61	0.68	3.23	0.18	2.05	0.06	1.44	0.02
550			6.17	0.81	3.56	0.21	2.25	0.07	1.59	0.03
600 650			6.73 7.29	0.95 1.10	3.88 4.20	0.25 0.29	2.46 2.66	0.08 0.09	1.73 1.88	0.03 0.04
700			7.85	1.26	4.53	0.33	2.87	0.11	2.02	0.05
750					4.85	0.38	3.07	0.12	2.16	0.05
800 850					5.17 5.50	0.42	3.28 3.48	0.14 0.16	2.31 2.45	0.06
900					5.82	0.47 0.53	3.69	0.16	2.43	0.07 0.07
950					6.15	0.58	3.89	0.19	2.74	0.08
1000					6.47	0.64	4.10	0.21	2.89	0.09
1050 1150					6.79 7.44	0.70 0.83	4.30 4.71	0.23 0.27	3.03 3.32	0.10 0.12
1200					7.76	0.90	4.92	0.30	3.46	0.12
1250							5.12	0.32	3.61	0.14
1300							5.33	0.34	3.75	0.15
1350 1400							5.53 5.74	0.37 0.39	3.90 4.04	0.16 0.17
1500							6.15	0.45	4.33	0.19
1550							6.35	0.47	4.47	0.20
1600 1650							6.56 6.76	0.50 0.53	4.62 4.76	0.21 0.23
1700							6.97	0.56	4.76	0.23
1750							7.17	0.59	5.05	0.25
1800	-								5.20	0.27
1850 1900									5.34 5.48	0.28 0.29
1950									5.63	0.31
2000									5.77	0.32
2100 2200									6.06 6.35	0.35 0.39
2300		Shaded a	area represen		ver 5 fps.				6.64	0.39
2400			Use with	caution.					6.93	0.45
2500									7.22	0.49
2600 2700										
2800										
2900										
3000										
				See pg 93	for friction	loss formulas	5			

FRICTION LOSS CHARACTERISTICS

PVC SCHEDULE 80 IPS PLASTIC PIPE

 Size: 4" thru 12"
 Flow: 10 thru 3000GPM

 ASTM D1785
 C=150
 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	_4	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	6	"	8	11	10	0"	1	2"
Avg.ID	3.7	786	5.7	709	7.!	65	9.4		11.	294
Pipe OD		500	l	525		525		750		750
Avg Wall		357	l	158		30	0.6			28
Min Wall		337	l	132		500	0.5		0.6	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
10 20	0.28 0.57	0.00 0.02	0.13 0.25	0.00 0.00	0.07 0.14	0.00 0.00	0.05 0.09	0.00 0.00	0.03 0.06	0.00
30	0.85	0.04	0.38	0.00	0.21	0.00	0.14	0.00	0.10	0.00
40	1.14	0.06	0.50	0.01	0.29	0.00	0.18	0.00	0.13	0.00
50	1.42	0.09	0.63	0.01	0.36	0.00	0.23	0.00	0.16	0.00
60	1.71	0.13	0.75	0.02	0.43	0.00	0.27	0.00	0.19	0.00
70 80	1.99 2.28	0.17 0.22	0.88 1.00	0.02 0.03	0.50 0.57	0.01 0.01	0.32 0.36	0.00 0.00	0.22 0.26	0.00
90	2.56	0.27	1.13	0.04	0.64	0.01	0.41	0.00	0.29	0.00
100	2.85	0.33	1.25	0.04	0.71	0.01	0.45	0.00	0.32	0.00
120	3.42	0.46	1.50	0.06	0.86	0.02	0.54	0.01	0.38	0.00
140	3.98	0.62	1.75	0.08	1.00	0.02	0.63	0.01	0.45	0.00
160	4.55	0.79	2.00	0.11	1.14	0.03	0.72	0.01	0.51	0.00
180 200	5.12 5.69	0.98 1.19	2.25 2.50	0.13 0.16	1.28 1.43	0.03 0.04	0.81 0.91	0.01 0.01	0.58 0.64	0.00 0.01
225	6.40	1.49	2.82	0.20	1.60	0.05	1.02	0.02	0.72	0.01
250	7.12	1.81	3.13	0.24	1.78	0.06	1.13	0.02	0.80	0.01
275	7.83	2.15	3.44	0.29	1.96	0.07	1.25	0.02	0.88	0.01
300	8.54	2.53	3.76	0.34	2.14	0.09	1.36	0.03	0.96	0.01
325 350	9.25 9.96	2.94 3.37	4.07 4.38	0.40 0.46	2.32	0.10 0.12	1.47 1.58	0.03	1.04 1.12	0.01
375	9.96	3.37	4.38	0.46	2.50	0.12	1.70	0.04	1.12	0.02
400			5.01	0.58	2.85	0.15	1.81	0.05	1.28	0.02
425			5.32	0.65	3.03	0.17	1.92	0.06	1.36	0.02
450			5.63	0.73	3.21	0.18	2.04	0.06	1.44	0.03
475			5.95	0.80	3.39	0.20	2.15	0.07	1.52	0.03
500 550			6.26 6.88	0.88 1.05	3.56 3.92	0.22 0.27	2.26 2.49	0.07 0.09	1.60 1.76	0.03 0.04
600			7.51	1.03	4.28	0.27	2.49	0.09	1.76	0.04
650			8.14	1.44	4.63	0.36	2.94	0.12	2.08	0.05
700			8.76	1.65	4.99	0.42	3.17	0.14	2.24	0.06
750					5.35	0.48	3.40	0.16	2.40	0.07
800					5.70	0.54	3.62	0.18	2.56	0.08
850 900					6.06 6.42	0.60 0.67	3.85 4.07	0.20 0.22	2.72 2.88	0.09 0.09
950					6.77	0.74	4.30	0.24	3.04	0.10
1000					7.13	0.81	4.53	0.27	3.20	0.12
1050					7.49	0.89	4.75	0.29	3.36	0.13
1150					8.20	1.05	5.21	0.35	3.68	0.15
1200 1250					8.56	1.14	5.43 5.66	0.38	3.84 4.00	0.16 0.17
1300							5.89	0.41	4.00	0.17
1350							6.11	0.47	4.32	0.20
1400							6.34	0.50	4.48	0.22
1500							6.79	0.57	4.80	0.24
1550							7.02	0.60	4.96	0.26
1600 1650							7.24 7.47	0.64 0.68	5.12 5.28	0.28 0.29
1700							7.70	0.72	5.44	0.23
1750							7.92	0.76	5.60	0.33
1800									5.76	0.34
1850									5.92	0.36
1900 1950									6.08 6.24	0.38 0.40
2000									6.40	0.40
2100					1				6.72	0.46
2200		Shaded a	area represent	s velocities o	ver 5 fps.				7.04	0.50
2300			•	caution.					7.36	0.54
2400 2500			030 11101	-24.0111					7.68 8.00	0.58 0.63
2600									0.00	0.03
2700										
2800										
2900										
3000										
				See pg 93						



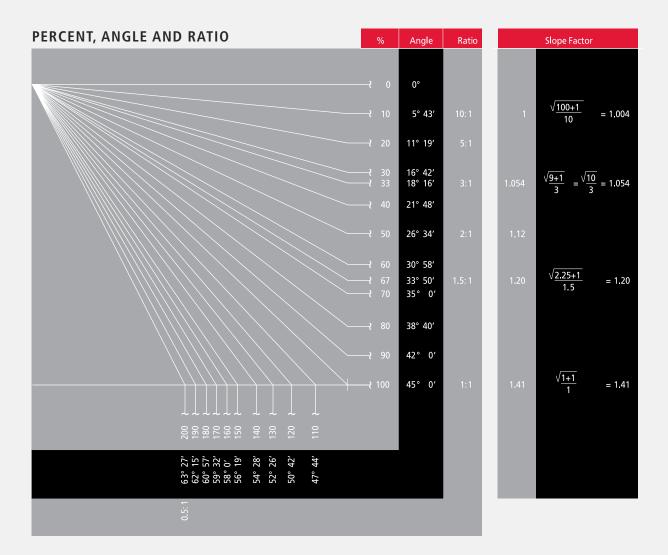
WATER METER PRESSURE LOSS CHART

AWWA STANDARD PRESSURE LOSSES (PSI)

Water Meter Nominal Size

Flow GPM	5/8″	3/4 "	1"	1½″	2"	3"	4"	Flow GPM
1 2 3	0.2 0.3	0.1 0.2						1 2
4 5	0.4 0.6 0.9	0.3 0.5 0.6	0.1 0.2					3 4
6	1.3	0.7	0.3					5 6 7
8 9	1.8 2.3 3.0	0.8 1.0 1.3	0.4 0.5 0.6					8 9
10 11	3.7 4.4	1.6 1.9	0.7 0.8					10 11
12	5.1	2.2	0.8 0.9 1.0					12
14 15	7.2 8.3	3.1 3.6	1.0 1.1 1.2					14 15
16 17	9.4 10.7	4.1 4.6	1.4 1.6	0.4 0.5				16 17
18 19	12.0	5.2 5.8	1.8	0.6				18 19
20 22	15.0	6.5 7.9	2.2	0.8 1.0				20 22
24 26		9.5 11.2	3.4 4.0	1.2 1.4				24 26
28 30		13.0 15.0	4.6 5.3	1.6 1.8	0.7			28 30
32 34			6.0 6.9	2.1 2.4	0.8 0.9			32 34
36 38			7.8 8.7	2.7 3.0	1.0 1.2			36 38
40 42			9.6 10.6	3.3 3.6	1.3 1.4			40 42
44 46			11.7 12.8	3.9 4.2	1.5 1.6			44 46
48 50			13.9 15.0	4.5 4.9	1.7 1.9			48 50
52 54				5.3 5.7	2.1			52 54
56 58				6.2 6.7	2.3 2.5			56 58
60 65 70				7.2 8.3 9.8	2.7 3.2 3.7	1.0 1.1		60 65
75				11.3	4.3	1.3 1.5	0.7	70 75
80 90				12.8 16.1 20.0	4.9 6.2 7.8	1.6 2.0 2.5	0.7 0.8 0.9	80 90
100 110 120				20.0	9.5 11.3	2.5 2.9 3.4	1.0 1.2	100 110 120
130 140					13.0 15.1	3.9 4.5	1.4 1.6	130 140
150 160					17.3	5.1 5.8	1.8	150 160
170 180					20.0	6.5 7.2	2.4 2.7	170 180
190 200						8.0 9.0	3.0 3.2	190 200
220 240						11.0 13.0	3.9 4.7	220
260 280		Shaded area	as exceed 75%	of maximum		15.0 17.3	5.5 6.3	260 280
300 350		sa	fe meter capac	ity.		20.0	7.2 10.0	300 350
400 450							13.0 16.2	400 450
500							20.0	500 75%
75% of max. meter capacity	15 gpm	22.5 gpm	37.5 gpm	75 gpm	120 gpm	225 gpm	375 gpm	of max. meter capacity

SLOPE IRRIGATION CHART



MAXIMUM PRECIPITATION RATES

				Inches F	er Hour			
Soil Texture	0 to 5%	% slope	5 to 8%	6 slope	8 to 12°	% slope	12% +	- slope
Soil Texture	Cover	Bare	Cover	Bare	Cover	Bare	Cover	Bare
Coarse sandy soils	2.00	2.00	2.00	1.50	1.50	1.00	1.00	0.50
Coarse sandy soils over compact subsoils	1.75	1.50	1.25	1.00	1.00	0.75	0.75	0.40
Uniform light sandy loams	1.75	1.00	1.25	0.80	1.00	0.60	0.75	0.40
Light sandy soils over compact subsoils	1.25	0.75	1.00	0.50	0.75	0.40	0.50	0.30
Uniform silt loams	1.00	0.50	0.80	0.40	0.60	0.30	0.40	0.20
Silt loams over compact subsoil	0.60	0.30	0.50	0.25	0.40	0.15	0.30	0.10
Heavy clay or clay loam	0.20	0.15	0.15	0.10	0.12	0.08	0.10	0.06

The maximum PR values listed are as suggested by the United States Department of Agriculture. The values are average and may vary with respect to actual soil condition and condition of ground cover.





Data Needed

- Maximum current draw of the electrical unit (valve or controller) in amperes (I)
- Distance in feet (one way) to the electrical unit (F)
- The allowable voltage drop in the wire without affecting functions of the electrical unit (Vd)

Steps

1. Calculate the maximum allowable wire resistance per 1000 feet with the following formula:

$$R = \frac{*500 \times Vd}{F \times 1}$$

where R = allowable wire resistance per 1000 feet.

2. Select the wire size from Chart #2 which has a resistance less than that calculated in the above formula.

EXAMPLE: A valve with a minimum operation voltage of 20 volts and inrush current of .30 amps is to be located 2680 ft. from a controller. The controller minimum output voltage is 24V ac.

The allowable voltage drop (Vd) = 24 - 20 = 4 voltsThe distance to valve (F) = 2680 ft.The current draw (I) = .3 amps

$$R = \frac{500 \times 4}{2680 \times .3} = 2.49 \text{ ohm/}1000 \text{ ft.}$$

From Chart #2 we find that #14 AWG wire has slightly too much resistance. Therefore, choose #12 AWG copper wire.

The accompanying charts are useful for quick and easy selection of wire sizes for valves with standard and optional solenoids. Chart #3 is set up to provide maximum wire runs given a standard 24V ac valve with a minimum operation voltage of 20 volts and a controller output of 24V ac. Chart #4 is a multiplier factor for determining maximum wire runs for other controller output voltages and optional solenoids.

EXAMPLE: Determine maximum wire run to a valve with model 24V ac-D solenoid and controller output voltage of 26 volts and #14 control and ground wire.

From Chart #3 we find a length of 2590 ft. with #14 ground and control wire. From Chart #4 the mutiplier factor at 26V ac controller output with a model 24V ac-D solenoid is 4.33. Therefore, the maximum wire distance to the valve is: 4.33 x 2590 feet = 11,215'.

MINIMUM OPERATING VOLTAGES AT VARIOUS STATIC PRESSURES (standard 24V ac solenoid)

CHART 1

Minimum Solenoid Operation Voltage Under Various Line Pressure

Line Pressure	Voltage (Internal Bleed Configuration)	Voltage (External Bleed Configuration)
200 psi	21.1	
175 psi	20.2	
150 psi	19.1	20.0
125 psi	18.2	19.1
100 psi	17.1	18.2
75 psi	16.1	17.3
50 psi	16.0	16.4

CHART 2

Copper Wire Resistance of Various Sizes

Size AWG	Resistance at 20°C Ohms per 1000 ft.
4	.25
6	.40
8	.64
10	1.02
12	1.62
14	2.57
16	4.10
18	6.51

CHART 3

Maximum One-Way Distance (ft) Between Controller and Valve (Standard 24V ac Solenoid)*

Valve Wire Sizing							
Ground	CONTROL WIRE						
Wire	18	16	14	12	10	8	6
18	1020	1260	1470	1640	1770	1860	1930
16	1260	1630	2000	2330	2610	2810	2960
14	1470	2000	2590	3180	3710	4150	4480
12	1640	2330	3180	4120	5050	5900	6590
10	1770	2610	3710	5050	6540	8030	9380
8	1860	2810	4150	5900	8030	10400	12770
6	1930	2960	4480	6590	9380	12770	16540

^{*} Solenoid Models: 24V ac, Pressure: 150 psi, Voltage Drop: 4V, Min Op. Voltage: 20 V Amperage (peak): 0.3A

MULTIPLIER FACTOR FOR VARIOUS CONTROLLER OUTPUT VOLTAGES AND OPTIONAL LOW VOLTAGE SOLENOIDS

CHART 4

Controller Output	24-VOLT SOLENOID			
Voltage	24V ac	24V ac-D	24V DC	
28	2.00	5.79	5.45	
27	1.75	5.05	4.77	
26	1.50	4.33	4.09	
25	1.25	3.61	3.41	
24	1.00	2.88	2.73	
23	.75	2.16	2.05	
22	.50	1.44	1.36	

CHART 5

Controller Output	12-VOLT SOLENOID				
Voltage	12V ac	12V ac-D	12V DC		
16	.58	2.50	1.96		
15	.50	2.08	1.63		
14	.41	1.67	1.30		
13	.33	1.25	.98		
12	.25	.83	.65		
11	.17	.42	.33		

^{*} This assumes control wire and ground wire are the same size.

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All Rain Master "R M E" Series Controllers have a 5-year (5-yr) warranty; all other Rain Master products have a 2-year (2-yr) warranty. A 3-year (3-yr) warranty applies to the following products: the KwikDial® controller, and the Wireless RainSensor®; a 2-year (2-yr) warranty applies to: the JR MaxTM controller, the CRR, 430R, TITAN, and drip zone kit filter and pressure regulator.

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In no event shall Irritrol be liable or in any way responsible for any damages or defects in the product which were caused by repairs or attempted repairs performed by anyone other than an authorized Irritrol /Service dealer or center.

This warranty supersedes all previous warranties and shall be the sole and exclusive warranty granted by Irritrol and shall be the sole and exclusive remedy available to the trade customer. Correction of defects, in the manner and period of time described herein, shall constitute complete fulfillment of all liabilities and responsibilities of Irritrol to the trade customer with respect to the product, and shall constitute full satisfaction of all claims, whether based on contract, negligence, strict liability or otherwise.

NOTE: The user is cautioned that changes and modifications made to the equipment without the express written consent of the manufacturer will void this warranty.

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